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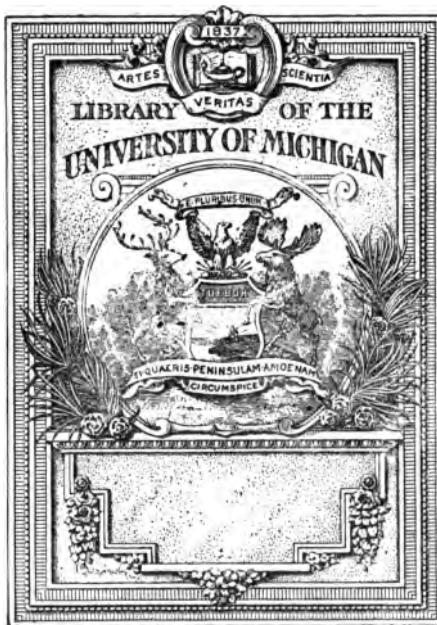
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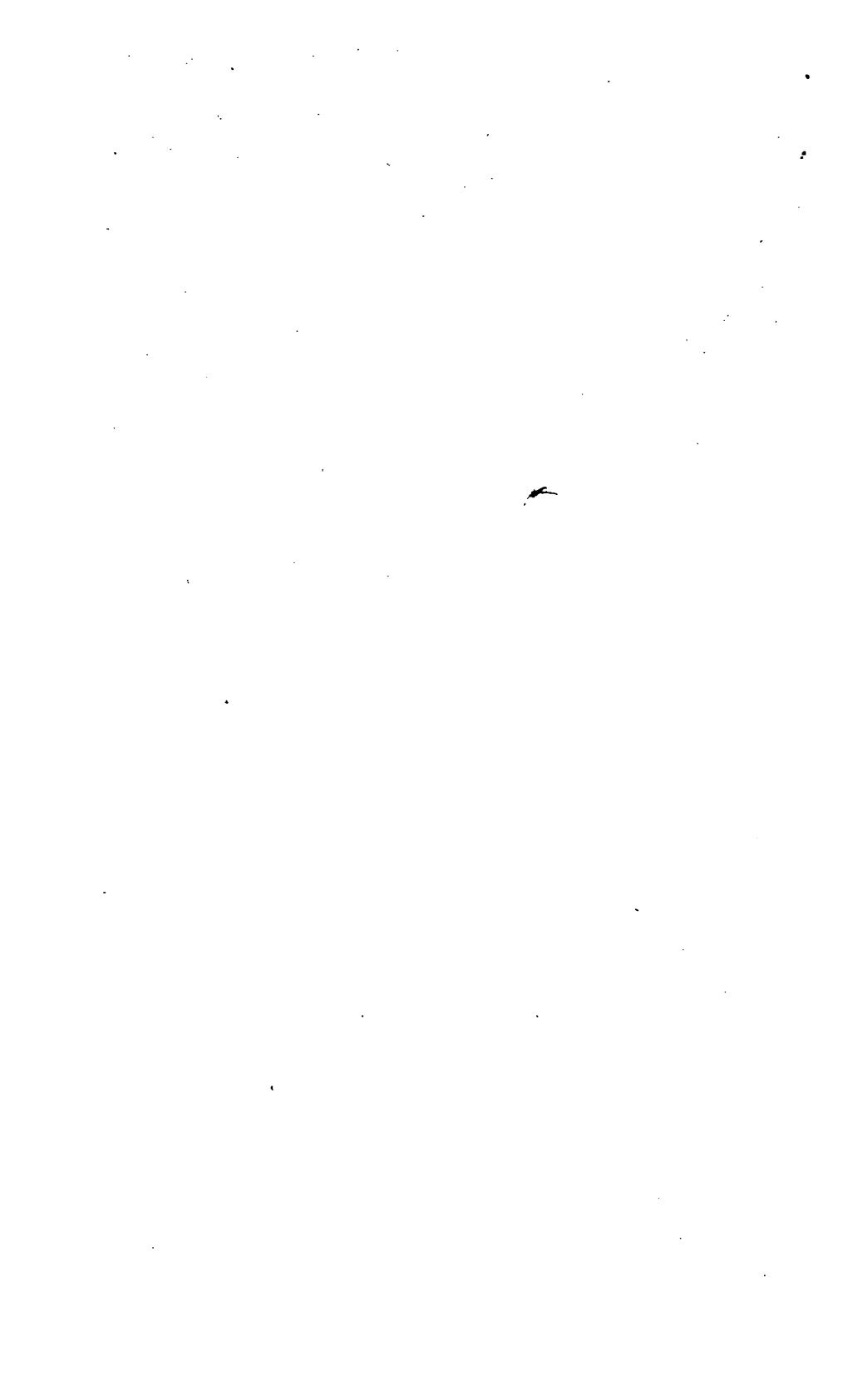


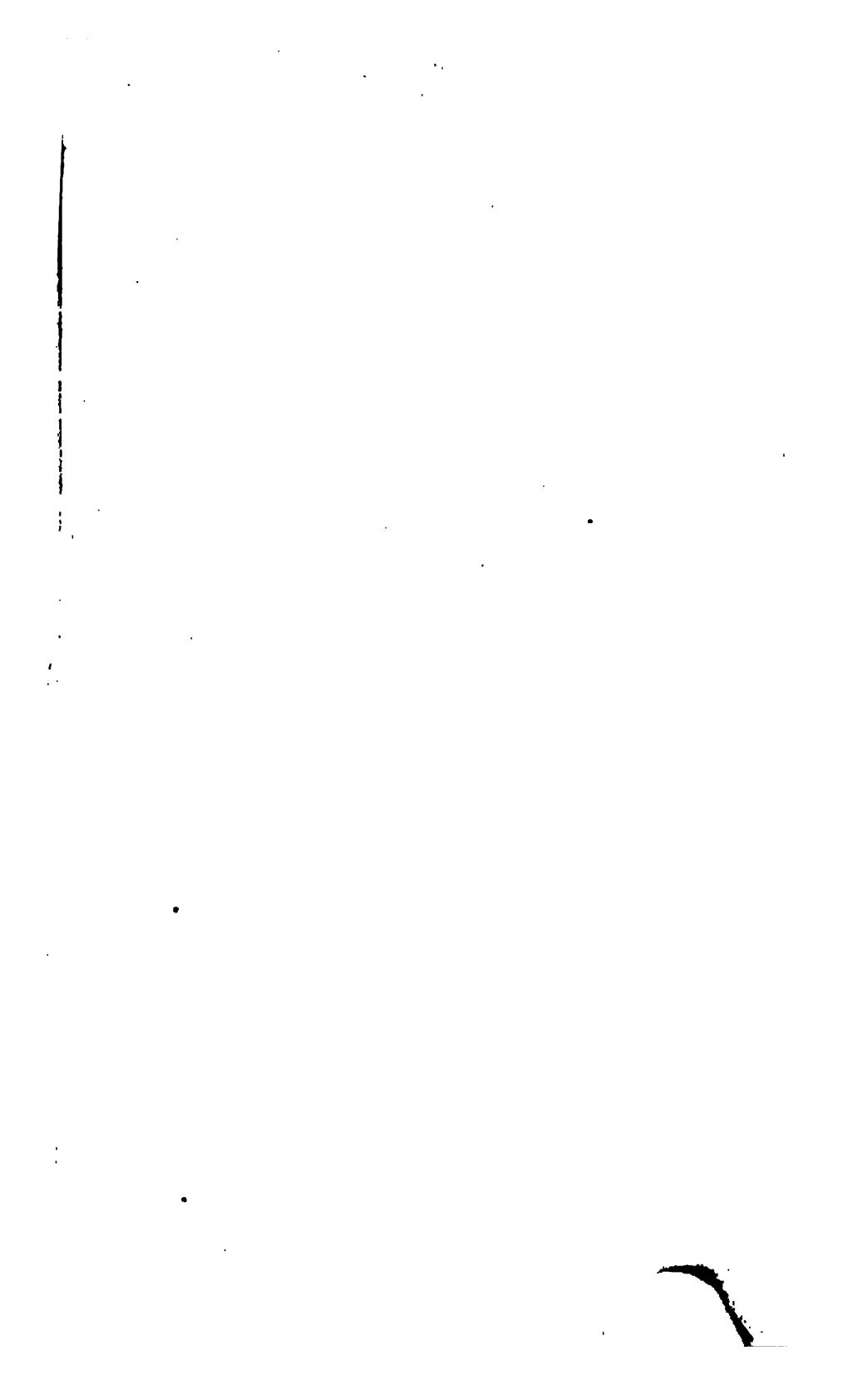
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A
SYNOPSIS
OF THE
NORTH AMERICAN
LICHENS:
PART II.
CONTAINING THE
LEGUMEAE, AND (IN PART) THE GRAPHTIDAE;

BY
EDWARD TUCKER, B. A.
OF THE UNIVERSITY OF TORONTO.

WITH PLATES OF LICHENS
IN PART IN COLORED LITHOGRAPHS
BY
JOHN COOPER.

PRINTED FOR THE AUTHOR.



A

SYNOPSIS

OF THE

NORTH AMERICAN

LICHENS:

PART II.,

COMPRISING THE

COIDEACEI, AND (IN PART) THE GRAPHIDACEI;

BY

EDWARD TUCKERMAN, M. A.,
AUTHOR OF *GENERA LICHENUM*.

NEW BEDFORD, MASS.
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SYNOPSIS OF THE NORTH AMERICAN LICHENS, Part I., Published by S. E. Cassino, Boston, Mass.

PREFACE.

Part I. of the Synopsis of the North American Lichens by Professor Edward Tuckerman, of Amherst, was published in 1882. He worked upon the second part nearly up to the time of his death, March 15th, 1886. It was found that the manuscript left by him contained the Lecideacei and a portion of the Graphidacei, leaving the Genus Graphis incomplete. It has been thought that the publication of this manuscript would be to the advantage of Science, and it has been placed in my hands for that purpose. It should be understood, however, that the work had not been subjected to the thorough revision it would have undergone before its publication by the author, in regard to which there were many pencil notes on the manuscript. I give his manuscript just as left by him. But I have given as additions such descriptions of some of the new species which I have seen, as I am able to, with the names of the species indicated to be studied, which I have not seen. I have also thought it would be acceptable to Students of Lichens to add as an appendix the descriptions of such North American Lichens not embraced in this work as are contained in Professor Tuckerman's occasional publications, which are not easily to be obtained.

There is a note in the manuscript of reference to be made to the articles on the Behring Strait Lichens by Nylander in *Flora*, 1884, and Professor Tuckerman would doubtless have availed himself of Nylander's more recent work on these Lichens had he lived.

HENRY WILLEY.

New Bedford, Mass., 1888.

Tribe II.—LECIDEACEI.

Fam. 3.—LECIDEEI.

Thallus crustaceous; now lobulate, or, very rarely, caulescent, but for the most part, uniform; adnate to the substrate.—Some remarks on the family may be turned to in the author's *Genera Lichenum*, p. 151.

Sub-Fam. 1.—BÆOMYCEI.

Apothecia prolonged downwards into a stalk (i.e. stipitate.)

The types here understood as Bæomyceine are sufficiently well distinguished from each other, and are very commonly regarded as indicating four genera. But *Bæomyces roseus* (constituting the genus *Bæomyces* of Fries, Koerber, &c.) is closely associable in all important structure—the abnormal cephaloid exhibition of the apothecia being left out of account—not only with *B. absolutus*, but with *B. aeruginosus* (*Icmadophila*, Trev., of Koerb., &c.) and the chief structural difference between the species named and *B. placophyllus*, &c. (*Sphyridium*, Flot., Koerb., &c.) is in the greater or less density of the tissues of the hypothecium and the stipes. The South American *Glossodium*, Nyl. *Syn.*, 1, p. 184, t VI., f. 5, 6 (Lindig *Herb. N. Gran.* n. 2745), which offers zeorine apothecia, appears comparable in this respect as in its hymenium—however striking the unilateral attachment of the latter—with *B. Aeruginosus*, nor widely separable in its hypothecium.—*Gomphillus*, Nyl., and *Thysanothecium*, Berk. & Mont., which the author first named has admitted into his *Bæomycei*, are unknown here; if not also too discrepant from the Sub-family.

XLVII.—BÆOMYCES, Pers., DC.

Apothecia patellæform, margined by a proper excipie; or, rarely, cephaloid and immarginate; more or less distinctly stipitate. Spores (in sub-cylindraceous thekes) from ellipsoid sub-fusiform, from simple 2-4-locular, colourless. Spermatia (so far as observed) oblong, on multi-articulate sterigmas. Thallus horizontal, crustaceous, lobed, or uniform.—Observations on the anatomy of the genus may be found in Nylander *Syn. 1*, p. 176, &c., *passim*.

1. *B. placophyllus*, Ach. ; thallus sub-foliaceous, thickish, orbicular, wrinkled and plicate, glaucous-virescent, the circumference constituted of rounded, sub-imbricate, flexuous lobules; apothecia stipitate, pileate, reddish-brown, the compressed stipe beset with glebous squamules. Spores from ellipsoid soon oblong, simple, 10-15 by $2\frac{1}{2}$ - $3\frac{1}{2}$ mic.—*Ach. Meth.*, p. 323, t. 7, f. 4; *L. U.*, p. 574. *Biatora*, *Fr. L. E.*, *Tuckerm. Lich. exs. n. 42*. *Sphyridium*, *Th. Fr. Scand.* p. 327.

Sterile earth on slides, and on banks of streams, in the White Mountains, N.H., *Tuckerman* *Syn. N.E.*, 1848.

2. *B. Byssoides* (L.) Schær. ; thallus crustaceous, effuse, granulose, greenish-glaucous, the glebous granules becoming squamaceous and crenate-lobulate (now sorediiferous); apothecia (smaller than in n. 1) pileate, from brownish-flesh coloured at length dark-brown, now conglomerate, the compressed, furrowed stipes mostly naked, now divided above, and now obsolete. Spores oblong-ellipsoid, simple, 7-12 by 3-4 mic.—*Fr. L. E.* p. 257 (*sub Biatora.*) *Tuckerm. Lich. exs. n. 41*. *Bæomyces rufus*, *Nyl. Syn. 1*, p. 176, t. 1, f. 12-14.

On the earth, rocks, and dead wood, common in mountainous regions. New York, *Halsey*, View, 1823. Mountains of New Hampshire, *Tuckerman*. North Carolina mountains, *Buckley*. Mountains of Oregon, *Hall*.

3. *B. roseus*, Pers. ; thallus effuse, contiguous, granulate

and warted, glaucous; apothecia stipitate, the stipes white, naked, crowned by cephaloid and immarginate, globular soon balloon-shaped, flesh-coloured apothecia. Spores in much-narrowed thekes, slender, fusiform-oblong, simple, 16-26 by 2-3 mic. *Ach. L. U. p. 572.* *Tuckerm. exs. n. 40.* *Nyl. Syn. 1, p. 479.*

b. *fungoides*; granules of the thallus running together and glebous, white; the stipes longer, and often clothed with the granules.—*Bœmyces, Ach. L. U. p. 572.* *Nyl. Syn. 1. p. 179, & in Lindig Herb. N. Gran. n. 708, 2567.*

On sterile earth, common. Middle States, *Muhlenberg, Catal. 1818*; *Torrey*. New England and Virginia, *Tuckerman*. North and South Carolina, *Ravenel*. Alabama, *Peters*.—b, on mountains in tropical countries. Mexico (*Humboldt*), *Nylander, Syn. 1858*.

4. *B. absolutus*, Tuckerm.; thallus crustaceous, effuse, very thin and sub-membranaceous, greenish; apothecia short-stipitate, flat, becoming flexuous, pale-flesh coloured, the thin, demiss margin disappearing. Spores ellipsoid and oblong-ellipsoid, simple, 10-16 by 4-6 mic.—*Suppl. 2, l. c. p. 201, & in Wright Lich. Cub. n. 23, 24.* *Nyl. Syn. 1, p. 178, & in Lindig Herb. N. Gran. n. 2587.* *Biatora icmado-phila, v. stipitata, Mont. & Tuck. in Ann. Sci. Nat. 4, 8, p. 298.*

On sand, Alabama (*Peters*), Tuckerman *l. c. 1859*. On wet rocks, North Carolina, *Curtis*. Found also on the earth, in tropical America; Venezuela, *Fendler*; Island of Cuba, *Wright*; New Granada, *Lindig*.

5. *B. æruginosus* (Scop.) DC.; thallus tartareous, rugose-granulate and warted, greenish-glaucous and white; apothecia sessile or now sub-stipitate, ample, rosy-flesh coloured and paler (now discoloured) the flattish, wrinkled disk bordered by a thin proper margin, and more or less by a flexuous thalline one, or now finally turgescent and immarginate (now conglomerate). Spores from oblong becoming fusiform, and from commonly 2-4 locular, 20-30 by 4-6 mic.—*Lecidea, Schær. Spicil.*, *p. 177.* *Biatora*

icmadophila, Fr. L. E. p. 259. Tuckerm. Lich. exs. n. 43.
Bæomyces, Nyl. Syn. I, p. 183.

Rotten wood in moist mountain forests, where also on *Sphagnum*, and on the earth, *Muhlenberg Catal.* 1818. Canada, *Agassiz*. Arctic America, *Richardson*. Rocky Mountains, *Brandegee*. West Coast, from Oregon to Sitka, *Hall*, &c.

Sub-Fam. 2.—BIATOREI.

Apothecia sessile; the exciple paler than the disk.

XLVIII.—BIATORA, Fr.

Apothecia softish, readily turgescent and finally cephaloid; variously coloured. Spores either ellipsoid, and simple (§2) or more or less oblong, and bilocular (§3) or quadrilocular (§4) or fusiform passing into acicular, and finally plurilocular (§5) or very minute and numerous in the thekes (§6) colourless. Spermatia exhibiting conditions of all the types. Thallus now lobulate (§1) as are also rare exceptions in §2; but, for the most part, uniform.—*Fries* (*Lich. Eur.* pp. 247-251) has considered at length the distinction of the large group before us; and some observations upon it may be turned to in the present writer's *Genera*, p. 154. Whether, with Koerber, and most recent lichenologists, it be elevated—however commingled with eulecideine and even Parmelieine elements, as they are here regarded—to the rank of a family, or, with Nylander, and others, reduced to only a section of a genus, it is evident that these more modern arrangements take their start from Fries's thought, and more or less represent it. Only the scarcely explained disposition of Dr. Th. Fries (*Lich. Scand.*) seems quite irreconcilable.

* *Psora. Thallus squamulose; more or less lobed.*
 † *Rock and earth lichens.*

1. *B. caulophylla*, Tuckerm. ; thallus of erect, stipitate, compressed, greenish-glaucous and cinerascent lobes, which are dilated and lobulate above, and crowded together there into a plicate white-mealy crust ; apothecia of middling size, elevated-sessile, the disk reddish-black, the stout, pale margin soon also blackening. Spores ovoid-ellipsoid, 7-13 by 4-6 mic.—*Obs. Lich. 4, l. c. 12, p. 178.*

Rocks, Sierra Nevada, California (*Bolander*) Tuckerman *l. c. 1877.*—Apothecia exceeding at length 2^{mm.} in width.

2. *B. atro-rufa*, (Dicks.) Fr. ; thallus of small, cartilagineous, roundish, adnate, crenate and lobulate, now sub-imbricate scales which run together into a contiguous crust more or less effigurate at the circumference, pale-whitish to dark-brownish-ash coloured, on a black hypothallus ; apothecia middling-sized, soon closely appressed and explanate, finally often tumid, and confluent in difform masses, dark reddish-brown and black, the thin margin early disappearing. Spores ovoid-ellipsoid, 12-18 by 5-7 mic.—*Lecidea, Schær. Spicil. p. 123. Nyl. Scand. p. 198.*

On the earth in alpine districts. White Mountains, *Tuckerman, Syn. 1848.* Tadousac, Canada, *A. T. Drummond.* Rocky Mountains, *Brandegee.* Greenland, *Vahl*, e Th. Fr.

3. *B. Petri*, Tuckerm. ; thallus of middling-sized, membranaceous-cartilagineous, from orbicular becoming oblong-difform, undulate-lobate, incumbent or loosely imbricate, concave scales, pale-greenish glaucous running into brownish, beneath clothed with a thin, brown hypothallus ; apothecia middling-sized, rather elevated, polished, the flat, blackish-rufous disk excluding finally the stout, flexuous, black margin. Spores ovoid-ellipsoid, 9-11 by 4-5 mic.—*Obs. Lich. 4, l. c. 12, p. 179.*

Upon mosses in calcareous regions. Moulton, Alabama (*Hon. T. M. Peters*) Tuckerman, *l. c.*, 1877. Thallus with much the habit of growth, and coloration of *Endocarpon arboreum*, Schwein. ; the scales, as seen, about 2-4^{mm.} in

width. Apothecia 1^{mm.} to 2^{mm.} 5, wide.

4. *B. lurida*, (Sw.) Fr.; thallus of almost ample, thickish closely adnate, rounded, sinuately lobed, imbricately incumbent scales, from pale passing into dark-lurid brown, opaque, beneath white; apothecia middling-sized, adnate, flat, from reddish-brown soon black, becoming convex, and the originally obtuse margin disappearing. Spores oblong-ovoid, 12-16 by 5-7 mic.—*Fr. L. E. p. 253. Lecidea, Schær. Spicil. p. 108.*

On the earth in calcareous districts throughout Europe, but not reported from Greenland, nor known here: being yet possibly represented by two specimens from the Rocky Mountains (Colorado, *Brandegee*) and one from Oregon (*Cusick*) in herb. Sprague, which seem scarcely to differ. The lichen is distinguished from the next following one by its thinner, closely appressed, lurid and dull thallus, flattish apothecia, and rather larger spores.

5. *B. globifera*, (Ach.) Fr.; thallus of ample, thick, cartilaginous, reniform, more or less polished, lobed, imbricate, ascending scales, from pale-greenish, soon reddish-chestnut, beneath white; apothecia middling-sized, elevated, globose, sub-immarginate, blackening, with now a greenish tinge. Spores ovoid-ellipsoid, 10-14 by 5-7 mic.—*Fr. L. E. p. 254. Lecidea, Schær. Spicil. p. 109.*

b. *rubiformis*, Fr.; the reduced scales thicker, paler, and conspicuously white-margined; the apothecia more or less conglomerate.—*Nyl. Scand. p. 193. Lecidea, Wahl., Th. Fr. Scand. p. 412.*

On the earth in calcareous districts, especially abundant on the Pacific coast. North America, Acharius, *Syn.*, 1814. Greenland, *Vahl*, e Th. Fr. *l. c.* Mt. Mansfield, Vermont, *Pringle*. Rocky Mountains, *Brandegee*. California, *Bolander*. Oregon, *Cusick*. Thallus 4-6^{mm.} in width.—b, Greenland, *Vahl*, *l. c.*, and elsewhere in Arctic America, Th. Fr. in *Journ. Linn. Soc., Lond.*, 1879. And scarcely different in the Rocky Mountains, in Colorado, *Brandegee*.

6. *B. luridella*, Tuckerm.; thallus of small, thickish,

appressed, rounded, from glebous finally crenate-lobate, and sub-imbricate scales, from tawny passing into dark-red, now suffused with white, beneath white; apothecia minute, adnate, convex, sub-immarginate, black. Spores ovoid, 7-11 by 4-6 mic.—*Obs. Lich. 2, l. c. 5, p. 418 (sub Lecid.) Gen. p. 156.*

On calcareous earth, Rocky Mountains, in New Mexico (*Fendler*) Tuckerman *l. c.* 1862. On the Snake fork of the Columbia river, *Hayden*. Colorado, *Brandegee*. Mt. Ritter, California, *Bolander*. Thallus scarcely exceeding 2^{mm.} in width. Apothecia 0^{mm.} 5-0^{mm.} 7 in width.

7. *B. rufonigra*, Tuckerm.; thallus of small, irregular, scattered or crowded, soon ascendant and imbricate, concave, round-lobed, smooth scales, brownish-yellow passing into blackish-olivaceous above, the pale edges soon livid and blackening, the black under side clothed more or less with a blackening hypothallus; apothecia middling-sized, adnate, flat, from dark-rufous soon black and convex, and the thin margin excluded. Spores from ellipsoid at length oblong, 8-14 by 5-7 mic.—*Syn. N. E. p. 53.*

Rocks, New England, *Tuckerman* *Enum. Lich. N. E.*, 1838. Lake Superior, *Agassiz*. Lake Athabasca, *Macoun*. Middle States, *Michener*; *Austin*; &c. Carolinas, Tennessee, and Georgia, *Ravenel*. Illinois, and Missouri, *Hall*. Texas, *Wright*. Arizona, *Pringle*. British Columbia, *Macoun*.—Scales of the thallus scarcely more than 2^{mm.} wide.

8. *B. scotopholis*, Tuckerm.; thallus areolate-squamulose, blackish-chestnut, the minute, thin, rounded, polished, discrete scales becoming elevated at the edges, crenate-lobate, crowded, and sub-imbricate, upon a black, fringing hypothallus; apothecia adnate, flat, the rufous disk blackening and finally turgescent, and the stout, crenulate, livid margin disappearing. Spores ellipsoid, 8-11 by 3-5 mic.—*Calif. p. 25.*

Sandstone rocks, coast of California, (*Bolander*) Tuckerman *l. c.* 1866. Dalles of the Columbia, Oregon, *Hall*. Thallus scarcely at length reaching 2^{mm.} in width. Apothecia

scarcely surpassing 1^{mm.} in width. The largest conditions of the lichen comparable now with small ones of the next species.

9. *B. Russellii*, Tuckerm.; thallus of ample, thick, from rounded variously irregular, discrete finally crowded, appressed but soon ascendant undulate, round-lobed, often reticulately furrowed scales, from pale-passing into bright-reddish tawny, with white edges, beneath white; apothecia of middling size, sessile, soon turgid, rusty-red (nigrescent) with often a greenish bloom, the paler obtuse margin disappearing. Spores ellipsoid, 9-12 by 4-6 mic.—*Obs. Lich. 2, l. c. 4, p. 417 (sub Lecidea.) Gen. p. 155.*

Calcareous rocks, Vermont (*Russell*) Tuckerman *l. c.* 1862. New Jersey, *Austin*. Maryland, *Tuckerman*. Georgia, *Ravenel*. Alabama, *Peters*. Texas, *Wright*. Ohio, *Miss Biddlecombe*. Missouri and Kansas, *Hall*. Rocky Mountains, *Hayden*; &c. California, *Bolander*. British Columbia, *Macoun*.—Apothecia of the size of those of *B. globifera*; or, from 1^{mm.} 5 reaching 2^{mm.} in width.—A state with whitened scales (*f. dealbata*) occurs in California, *Bolander*.—The lichen is in several respects comparable with the European *B. testacea*; and it also closely approaches the brownish form of *B. decipiens*.

10. *B. crenata*, (Tayl., Nyl.) Tuckerm.; thallus of ample, thick, closely adnate, peltiform, sub-entire, brownish-red scales, which are depressed at the margin and conspicuously hollowed at the centre; apothecia scarcely at length middling-sized, marginal, sessile, at first flat with an obtuse thalloid border, which is excluded finally by the soon blackening disk. Spores oblong-ovoid, 12-17 by 5-7 mic.—*Tuck. Gen. p. 156. Endocarpon crenatum & E. Speireum, Tayl. in Hook. Lon. Journ. Bot. 6. p. 156. Lecanora Chonion, Tuckerm. Suppl. 1, l. c. p. 425.*

b. *dealbata*, Tuck.; the scales white.—*Lecidea coroniformis, Krempehl. exot. Flecht. in Verhandl. Zool. Bot. Gesellsch. 1864, pl. 4, f. 1.*

On the earth, Prairies of the Blanco, Texas, *Wright*. Tuckerm. *l. c.* 1858. Coahuila, Mexico, *Dr. Palmer*.—

Scales now exceeding 8^{mm.} in width.—Closely associable with the last, and very near to the next, to which, in fact, the normally coloured Cape of Good Hope lichen (*Zeyher*) was referred (by Laurer?) in herb. Sonder. The whitened condition is perhaps the more frequent here; it has been minutely described, as above, by *Krempehuber*. Taylor's original specimens (herb. Tayl.) fully confirm Nylander's view of the species; but the name is scarcely a happy one.

11. *B. decipiens*, (Ehrh.) Fr.; thallus smaller and thinner than that of the last preceding species, the discrete, now at length crowded scales from peltiform variously extended, sinuous, and round-lobed, irregularly more or less concave, often furrowed, incarnate-brick coloured (now fuscous) suffused more or less at the edges with white, and white beneath; apothecia small to about middling, marginal, adnate, the disk from dark-brown soon blackening and convex, and the obtuse thalloid now white, the margin excluded. Spores oblong-ovoid, 10-16 by 5-7 mic.—*Fr. L. E. p. 252.* *Schær. Spicil. p. 115.* *Lecanora, Ach. L. U.*

On the earth in calcareous districts. North America, *Hoffmann D. Fl.*, 1796. Arctic America, *Richardson*, &c. Island of Anticosti, *Macoun*. Niagara Falls, *Miss Mary L. Wilson*. More common westward, Missouri, and Kansas, *Hall*. Nebraska, *Hayden*. Utah, *Watson*. California, *Bolander*. British Columbia, *Macoun*.—A wholly whitened form is not rare (f. *dealbata*, Auct.)—Apothecia not much over 1^{mm.} wide.

12. *B. icterica*, Mont.; thallus of scarcely the size but much the habit of the species last preceding, the discrete now crowded scales appressed, from round soon extended, and radiately round-lobed, smooth or furrowed, greenish-yellow (becoming darker-yellow, and tawny with age) with raised, paler edges, and white beneath; apothecia small to almost middling, sessile, from dark rufous nigrescent, soon convex, and the rather stout margin disappearing. Spores ovoid-ellipsoid, 12-18 by 5-8 mic.—*Mont. Fl. Chil. VIII.*, p. 170, t. 12, f. 4. *Lecidea endochlora*, *Tayl. in Hook. Lond. Journ. Bot. VI.*, p. 151. *Lecanora Wrightii*, *Tuck. Suppl. 1, l. c. p. 425.*

On the earth, Prairies of the Blanco, Texas (*Wright*) Tuckerman *l. c.* 1858. Arizona, *Pringle*. Colorado, *Brandegee*. Kansas, *Hall*. Minnesota, *Lapham*. And even at the Palisades of the Hudson, New York, *Austin*.

† *Lichens of dead wood*. Related together by the thallus, but ill associative, either among themselves or with the first section, by the fruit.

13. *B. ostreata*, (Hoffm.) Fr. ; thallus of membranaceous, reniform, soon ascending and imbricate, crenate-lobate, now also reduced and glebous scales, glaucescent becoming tawny, beneath white-powdery ; apothecia of middling size, adnate, flat, the black disk more or less white-pruinose, the persistent margin from white and lecanoroid soon blackening, and flexuous. Spores oblong-ellipsoid, 8-10 by 2-3 mic. — *Nyl. Scand. p. 242. Parmelia, Fr. L. E. p. 94.*

On carbonized pine wood, Vermont (*Russell*) Tuckerman *Gen. 1872*. On the same substrate, Mt. Desert, *Willey*. On the same, Washington Territory, *Suksdorf* in hb. Sprague.

14. *B. anthracophila*, Nyl. ; thallus of glebous, thickish, reniform, finally ascending and imbricate, sub-crenate, polished scales, from glaucescent passing into tawny-brown ; apothecia minute, adnate, soon convex, and immarginate, reddish-brown. " Spores fusiform, oblong, 7-13 by 2-4 mic." — *Nyl. in Flora, 1865, p. 603 ; & in Norrl. Lich. Fenn. n. 169. B. ostreata, v. Cladonioides, Fr. Summ. ; & in Lich. Suec. n. 28, pro p. Lecidea Cladonioides, Th. Fr. Scand. p. 417.*

On carbonized pine wood, Vermont, *Frost*. On chestnut rails, Amherst, Mass., *Tuckerman*. Dead wood, New Bedford, Mass., *Willey*. Base of pine trees, New Jersey, *Austin*. Apothecia not much exceeding 0mm. 5, in width. The New Jersey lichen might be taken for a reduced state of *Cladonia cæspiticia, f. epiphylla* ; and Fries's name indicates the same comparison. But the latter author referred the plant (from the obvious resemblance of the thallus) to *B. ostreata* ; and cannot therefore be cited for it (as in Th. Fr. *Scand.*) as a distinct species.

15. *B. Friesii*, (Ach.) thallus of minute, glebous, soon concrecent and effigurate crowded finally and sub-imbricate, membranaceous scales, from glaucescent becoming olivaceous brown; apothecia small, thin, flat, black, opake, with an elevated, persistent margin, soon rugose-plicate, difform, and heaped. Spores ellipsoid, 7-9 by 3-4 mic.—*Lecidea myrmecina*, Fr. L. E. p. 344. *L. Friesii*, Ach. Th. Fr. Scand. p. 416.

Dead pine wood, Ipswich, Mass., *Oakes*. Bark of White Cedar, New Bedford, *Willey*. Apothecia scarcely exceeding 1 mm. in width.

* * *Eubiatora*. *Thallus granulose*, now much reduced, or disappearing; but now ascending to squamulose types, as in nos. 16, 17, 20, 59, and 60.

† Spores ovoid-ellipsoid, simple.

a. *Stock of B. coarctata*.

16. *B. coarctata*, (Sm. Nyl.) Thallus of minute, squamaceous areoles, now scattered, and often crenate-effigurate, but passing into a contiguous chinky crust, from glaucescent soon ash coloured; apothecia small to minute, adnate, connivent, becoming open and gyalectiform, and finally flat, often difform, from pale-flesh coloured black, clothed with an accessory thalline veil, or, this disappearing, lecideoid. Spores ovoid-ellipsoid 14-23 by 7-11 mic.—*Lecidea*, Nyl. Scand. p. 196. Th. Fr. Scand. p. 447. *Parmelia*, Fr. L. E. p. 104.

b. *Brujeriana*, Schær.; thallus granulose, or obsolete; apothecia reaching middling size, at length elevated, black, and more or less flat, with a stout margin soon variously flexuous-irregular, the thalline margin wanting.—Schær. Enum. p. 77. *Lecidea Brujeriana*, Th. Fr. Scand. p. 449.

Lime-rocks, Vermont (*Frost*) Tuckerman Gen. 1872. Granitic rocks, Massachusetts, and Maine, *Willey*; and Pennsylvania, Dr. J. W. Eckfeldt. On the earth, California, *Bolander*. Rocks, Washington Terr., *Suksdorf*.—b, Sand-rock (resembling the rock of the Vosges on which this marked form was first found). Aiken, South Carolina,

Ravenel.—The proper exciple is the most pronounced of the fruit-envelopes, and the biatorine affinity the most clear; but this leaves undisturbed the curious resemblance to *Gyalecta*. Some writers note a double margin exterior to the proper one; and if I recognize this structure correctly in one of our forms (Grand Menan, *Willey*) the intermediate envelope seems by its pale-brown colour to suggest (the connivent disk shewing also often a white, powdery veil) some *Thelotrema*.

b. Stock of B. granulosa.

17. *B. glebulosa*, Fr.; thallus of appressed, from glebous soon extended, lobed and crenate, thickish scales, which are crowded together convex and variously contorted at the centre, but effigurate at the circumference, glaucous, and white; apothecia appressed, ample, flat, an obtuse, paler margin bordering a pale-flesh coloured, reddish, lurid-brown, or finally black disk, which is at length convex, often conglomerate. Spores ovoid-ellipsoid, 10-12 by 5-6 mic.—*Fr. L. E. p. 252. Lecidea Salweii, Borr.; Leight. Lich. Fl. Brit. p. 249. Biatora Wallrothii, Koerb. Syst. p. 193.*

On the earth on the Pacific Coast. California (*Bolander*) Tuckerman *Gen. 1872*. Oregon, *Hall*. Washington Territory, *Suksdorf*.—I have seen but few spores.

18. *B. granulosa*, (Ehrh.) Poetsch; thallus tartareous, effuse, of hemispherical, soon dilated and wart-like, irregularly sub-lobate and sub-imbricate, greyish-white and ash coloured, smooth granules, bursting often into more or less greenish powdery heaps; apothecia at length middling-sized, appressed, flattish, brick-coloured, flesh-coloured passing into livid, oliveaceous-brown, and black, with a thin, elevated margin which is soon excluded, and the fruit turgid, difform and conglomerate—the thallus at length crowded into little gray cushions interspersed among black ones of the heaped apothecia. Spores ovoid-ellipsoid, 9-15 by 5-7 mic.—*Ach. L. U. p. 383 (sub Lecanora) Lecidea, Ach. Syn. p. 37. Biatora decolorans, Fr. L. E. p. 266, a & b.*

On turfy and sandy soil, and also on dead mosses, and

dead wood, especially in mountainous districts. Arctic America (*Richardson*) *Hooker*, *l. c.* 1823. Canada, *A. T. Drummond*. New England, *Tuckerman*. New York, *Peck*. New Jersey, *Austin*. Pennsylvania, *Michener*. Rocky Mountains, *Bourgeau*. Oregon, *Hall*.

18. (b) *B. flexuosa*, Fr.; thallus thinner than in the last, the granules smaller, often flattened into sub-effigurate areoles, or crowded and somewhat rugose-plicate, greenish-gray or grayish-green, bursting often into powdery heaps as in a; apothecia small, the black disk always flat, the thin, livid margin at length very flexuous. Spores ovoid-ellipsoid, 6-10 by 3-5 mic.—*Fr. Lich. Suec.* *n.* 221. *B. decolorans* *b*, *Fr. L. E.* *p.* 268. *Lecidea, Nyl. Scand.* *p.* 197. •

On dead wood. Carbonized stumps of Pine in the White Mountains; and on Chestnut rails, Mass., *Tuckerman Gen.* 1872. On Hemlock, and White Cedar, Mass., *Willey*. Old rails, Maryland, *Tuckerman*. Old Pine boards, South Carolina, and on Bald Cypress, Georgia, *Ravenel*.

19. *B. viridescens*, (Schrad.) Fr.; thallus effuse, of very minute, smooth, or deliquescent and powdery granules, grayish-green; apothecia small, sessile, soon convex, and black, commonly conglomerate, the disk more or less scabrous, the thin, livid margin early disappearing. Spores ovoid, 8-12 by 4-6 mic.—*Koerb. Syst.* *p.* 201, *b. Lecidea viridescens, Th. Fr. Scand.* *p.* 445.

b. gelatinosa, Fr.; thallus—the granules running together or obsolescent—sub-membranaceous; apothecia larger, appressed, much flattened, sub-immarginate, smoothish, soon confluent and variously difform.—*Lecidea, Floerk. Ach. Syn.* *p.* 26. *Th. Fr. Scand.* *p.* 446.

On rotten wood. White Mountains, N.H., and Western Mass., *Tuckerman, Gen.* 1872. Vermont, *Frost*. New York, *Peck*. New Jersey, *Austin*.—*b*, White Mountains, *Willey*.

c. Stock of B. vernalis; which may also be taken, in a wide sense, to include all the remaining sections, and subordinate groups of the genus, as here known.

† *Thallus glaucescent.*

20. *B. parvifolia*, (Pers.) Tuckerm. ; thallus squamulose, the small, thin, appressed and ascendant, crenate scales soon palmately cleft, and at length irregularly linear-multifid, passing also into coraloid branchlets, glaucous-green becoming whitish, brownish, and reddish-brown, upon a more or less developed, from white soon rufous, and finally black hypothallus ; apothecia small to middling-sized, flattish, papillate, and proliferous-diform, the stout, sub-flexuous margin at length disappearing and the convex fruit heaped, brown, fulvous, and black. Spores from ellipsoid soon and characteristically oblong, 7-15 by 2-4 mic.—*Gen. p. 157* ; *Obs. Lich. 3. l. c. 6, p. 272*; & in *Wright Lich. Cub. n. 179-185 (sub Lecidea.)* *Parmelia (Psoroma) Mont. Cub. p. 215, t. 10, f. 3.* *Biatora Fendleri, Mont. & Tuck. in Ann. 4, 8, p. 296.* *Lecidea parvifolia, L. breviuscula, L. longiuscula, L. intermediella, & L. parvifoliella, Nyl. in Prodr. Nov. Gran. pp. 54, 130.*

✓ b. *subgranulosa*, Tuck. ; scales much reduced, squamaceous-granulose.—*Obs. Lich. l. c.*

c. *corallina*, Tuck. ; scales wholly changed into coraloid branchlets.—*Obs. Lich. l. c.*

Trees in tropical America ; exhibited also in less luxuriant conditions in the southern United States, and rarely also northward. Louisiana, (Hale) Tuckerman *l. c. 1858.* Texas, Ravenel ; Hall. Alabama and Mississippi, Beaumont, &c. Florida, Austin. Georgia, and South Carolina, Ravenel. Virginia, Tuckerman. Illinois, Hall. New Jersey, Austin. —Exceedingly variable in tropical America, and several more marked conditions were indicated as varieties by the writer (*l. c.*) and have since been raised to species by Nylander (*l. c.*) but there can be no hold in such discrimination, and no limit to the number of such species. If nowhere else, larger views than this of specific distinction are required in tropical lichens. Our plant at once exceeds notably the character of its group, and yet clearly falls back into it.

21. *B. campiocarpa*, Tuckerm. *herb.* ; thallus thin, scurfy

becoming granulose, glaucescent; apothecia small (0mm., 4-7, but reaching 1mm. in width) sessile, flattish, a dark-livid-brownish or reddish disk bordered by an obtuse, finally flexuous margin, which is at length excluded, the hypothecium blackish-brown. Spores narrow oblong, 5-12 by c. 2 mic., numerous (20-30?) in the thekes, the paraphyses scarcely distinct.

Upon bark on the Caloosa river, Florida, *Austin.*

22. *B. furfurosa*, Tuckerm.; thallus effuse, of minute, rounded, scattered, pale to dark-ashy-gray granules, on a thin, blackening hypothallus; apothecia reaching middling size, sessile, pale-yellowish-brown (and blackening) disk, bordered by a thin, transversely striate black margin, which is finally excluded, and imposed upon a blackish-brown hypothecium. Spores ovoid, 12-16 by 6-8 mic.—*Obs. Lich. 3, l. c. 6, p. 274; & in Wright Lich. Cub. n. 189.*

Trees, (Cuba, *Wright*) Caloosa river, Florida, *Austin.*

23. *B. hypomela*, Nyl.; thallus contiguous, chinky and granulate, greenish-glaucous, cinerascent, and brownish; apothecia middling-sized, appressed, flattish, the disk from bright-passing into lurid-tawny-dark-chestnut and blackish-brown, bordered by an obtuse, livid, blackening margin, and finally convex, and proliferous, imposed upon a black hypothecium. Spores ovoid-ellipsoid, 10-18 by 6-10 mic.—*Nyl. Lich. exot. l. c. p. 223, & in Prodr. N. Gran. p. 57.*

Trees. Houston, Texas, *Ravenel*; *Hall.* Darien, Georgia, *Ravenel*. Alabama, *Beaumont*. Florida, *Austin*.—The spores of the original lichen of Nylander (*Lich. exot.*) are noted as almost twice larger; but this difference disappears in a specimen from Cuba determined by the author of the species, the spores of which agree in size with those of the more northern specimens described above.

24. *B. peliaspis*, Tuckerm. emend.; thallus thin, rugose-verruculose, glaucescent (or obsolete); apothecia small to minute, sessile, plano-convex, disk dark-livid-fuscescent, naked or delicately white-pruinose, the thin, blackening, and

bright and finally flexuous margin at length demiss and disappearing, the thick hypothecium blackish-brown. Spores various in shape and size, finally acutate-ellipsoid, 6-12 by 3-6 mic., paraphyses conglutinate.—*B. peliaspis* & *B. peliaspistes*, *Obs. Lich. 4, l. c., 12, p. 179.*

Living bark, and dead wood of *Coniferae*, White Mountains, *Tuckerman*, l. c. 1877. Gaspé Coast, Canada, *Macoun*. Massachusetts, *Willey*. And scarcely different from the South.

25. *B. mutabilis*, (Fée); thallus scurfy, becoming contiguous and chinky, cinerascent; apothecia small, appressed, from flattish soon convex, the disk varying from pale to dark-reddish-brown, the thin, darker margin disappearing, within colourless. Spores ovoid-ellipsoid, 12-17 by 6-9 mic.—*Fée Suppl. p. 105, t. 42, f. 16.* *Nyl. Enum. Husnot*, p. 14. *Leight. Lich. Fl. Brit. p. 298.*

Trees, Mexico, Leighton, l. c., 1871. I have what I take for this lichen from Louisiana, *Hale*; and Florida, *Austin*; agreeing very well with other specimens referable here from Brazil, *Herb. V. d. Bosch*, and *Herb. Kunz.*, and no less with the Irish plant (*Herb. Taylor*).

26. *B. russula*, (Ach.) Mont.; thallus sub-cartilagineous, rimose-areolate soon granulate and rugose (rarely sorediiferous) greenish-ashcoloured, limited more or less by the blackening hypothallus; apothecia small to middling-sized, sessile, smooth, flat, a little concave, becoming flexuous and lobed, or also convex, and the thin, soon inconspicuous margin disappearing, scarlet, within yellow. Spores from ellipsoid soon oblong, 8-12 by 3-4 mic.—*Ach. L. U. p. 197;* *Syn. p. 40.*

Trees, North America, *Acharius Syn.* 1814. First observed in the warmer regions of South America, this is found also in Japan (*Wright*) in Portugal and the South of France (*Nyl.*) and here nearly throughout the United States. Florida, *Chapman*. Alabama, *Beaumont*. South Carolina, *Ravanel*. North Carolina, *Curtis*. Rocky Mountains, *Parry*. Ohio, *Lea*. New Jersey, *Austin*. New York, *Sartwell*.

27. *B. cinnabarina*, (Sommerf.) Fr.; thallus effuse, thin, chinky, soon granulate, and rugose-verruculose, glaucous-whitish; apothecia small to middling-sized, appressed, scarlet, with a demiss border, but soon convex and immarginate, and at length flexuous-lobate, and proliferous, within pale. Spores oblong, 8-12 by 2-3 mic.—*Lecidea, Sommerf. Lapp. p. 170. Biatora, Fr. L. E. p. 266. Koerb. Syst. p. 206. Lecidea, Th. Fr. Scand. p. 422.*

Trees, in the colder regions of the northern hemisphere; as also in the Australian alps. Greenland (*Vahl*) Th. Fr. l. c. 1861. British Columbia, *Macoun*. Oregon, *Lyall*.

28. *B. cuprea*, (Sommerf.) Fr.; thallus tartareous, of contiguous, sub-lobate granules, milky-white (becoming yellowish with age); apothecia small to almost middling-sized, adnate, hemispherical, immarginate, ochraceous-rufous passing into dark-ferruginous, reddish-brown, and blackish, often conglomerate. Spores from ellipsoid soon oblong, 12-16 by 3-6 mic.—*Lecidea, Sommerf. Lapp. p. 165. Th. Fr. Scand. p. 426. Biatora, Fr. L. E. p. 265.*

On the earth in alpine and arctic regions. Greenland (*Vahl*) Th. Fr. l. c. 1861. Islands of Behring's Straits, *Wright*.

29. *B. vernalis*, (L.) Fr.; thallus thin, now contiguous and chinky, but oftener minutely granulose, from pale becoming ashy-greenish, and glaucous; apothecia small, soon turgid and excluding the obtuse margin, often clustered and conglomerate, from pale-yellowish-soon tawny-and reddish-brown, and now finally blackening. Spores ellipsoid becoming oblong, often bilocular, 12-18 by 4-6 mic.—*Fr. Summ., a; L. E., b; Lich. Suec. n. 224. Tuckerm. Lich. exs. n. 44.*

Upon mosses, and bark; more rarely on dead wood. Arctic America (*Richardson*) Hooker, l. c. 1823; *Vahl*; *Wright*. Anticosti, *Macoun*. Canada, *Agassiz*. New England, *Tuckerman*. New York, *Peck*. New Jersey, *Austin*. Ohio, *Lesquereux*.

30. *B. sanguineo-atra*, (Fr.) Tuckerm.; thallus thickish,

of heaped, coalescent granules, from green becoming gray; apothecia reaching middling size, flattish, but—the thin margin disappearing—soon convex, dark-rusty brown, dark-sanguineous, and at length black, the hypothecium dark. Spores more or less (often fusiform-) ellipsoid, 10-20 by 4-6 mic.—*Tuckerm. Syn. N. E.* p. 60. *Lecidea, Nyl. Prodr.* p. 106; *Scand.* p. 199. *Biatora vernalis* b, *sanguineo-atra*, *Fr. L. E.* p. 263; *Lich. Suec.* n. 223.

Upon dead mosses at the base of trees, and on the earth. New England, *Tuckerman*, *l. c.* 1848. Canada, *A. T. Drummond*. New York, *Russell*. New Jersey, *Austin*. Illinois, *Hall*. Virginia, *Curtis*. Mountains of Georgia, *Ravenel*. Rocky Mountains, *Hall*. California, *Bolander*. Oregon, *Cusick*.—*Lecidea miscella*, Sommerf. (*L. Berengeriana*, Th. Fr. *L. cuprea*, v. *Berengeriana*, Nyl., e Fellm. n. 162) is scarcely well distinguished from the present. The lichen next following is perhaps more distinct.

31. *B. Diapensiae*, (Th. Fr.) thallus very thin, whitish, or obsolete; apothecia small to ample (0^{mm}, 7-2^{mm}. wide) sessile, flat, but the reddish-brown and blackening disk at length convex and tuberculate, and the uneven, finally flexuous, black margin disappearing, the hypothecium dark-redish brown. Spores from ellipsoid soon oblong, 10-14 by 4-6 mic.—*Lecidea, Th. Fr. Lich. Arct.* p. 209; *Scand.* p. 439. *Tuck. Gen.* p. 180. *Nyl. Lapp. Or.* p. 144.

On dead *Diapensia*, White Mountains, *Tuckerman l. c.* 1872.

32. *B. rufo-fusca*, Anz.; thallus thickish, verruculose-granulose, whitish; apothecia small, flat, with a thin margin, becoming convex and immarginate, from reddish-brown at length blackish-purple, the hypothecium pale. Spores ovoid-ellipsoid, “13-18 by 6-8½ mic.”—*Anz. Catal. Sondr.* p. 76; & *Lich. Lang.* n. 178. *Lecidea, Th. Fr. Scand.* p. 476.

Upon turfy earth in alpine and arctic districts. Greenland (*Vahl*) Th. Fr. *l. c.* 1861. I have not seen the Greenland lichen, but a specimen from the Rocky Mountains, in Colorado (Brandegee in *herb. Sprague*) with the thallus of *Lecid. miscella*, Sommerf., agrees entirely with the present in

the characteristic broad-limbate spores, and the pale hypothecium.—There are other members of the present series, as here understood, in which the thallus is scarcely developed, or only hypophlaeous. In part, these are common to us with Europe: time must decide whether this be not the case with the others also.

33. *B. carnulenta*, Tuckerm.; thallus obsolete; apothecia small to minute (0^{mm.}, 3—0^{mm.}, 6 wide) adnate, convex, the soon naked disk pale-livid-flesh-coloured, the demiss margin indicated by its darker colour, or quite disappearing, the hypothecium colourless. Spores ovoid-ellipsoid, 7-11 by 3-5 mic.—*Obs. Lich. 4, l. c. 12, p. 179.*

On dead, soft wood, White Mountains, *Tuckerman, l. c.*, 1877. On the same substrate, Massachusetts, Maine, and New York, *Willey. Illinois, Hall.*—With this I associate for the present a lichen of dead wood, in most respects similar, but differing in brown, rusty-brown, and at length blackening apothecia, which the agglutinate paraphyses, prevent my referring to the European *B. phæostigma*, Koerb.; inadequately exhibited in the published *exsiccati*.

34. *B. punctella*, Willey; thallus obsolete; apothecia very minute (0^{mm.}, 1—0^{mm.}, 2) adnate, convex and immarginate, from livid-pale soon black, the hypothecium colourless. Spores ellipsoid, 5-7 by 3 mic., the few paraphyses conglutinate.—*Willey msc.*

On dead wood, New Bedford, Mass., *Willey*.—Our smallest Biatora.

35. *B. turgidula*, (Fr.) Nyl.; thallus thin, scurfy, whitish, or obsolete; apothecia small to minute, adnate, from flattish soon turgid, and now tuberculate, immarginate, from pale-brownish or rufescent becoming black, more or less white-pruinose, for the most part dark within. Spores ellipsoid and oblong-ellipsoid, 6-12 by 3-5 mic.—*Lecidea, Fr. Koerb. Syst. p. 243. Th. Fr. Scand. p. 469. L. vernalis, v. turgidula, Nyl. Scand. p. 201.*

On the bark of coniferous trees, and on dead wood.

Greenland (*Vahl*) Th. Fr. *l. c.*, 1861. On bark of White Cedar, and on dead, soft wood, Massachusetts, and New Hampshire, *Willey*. On dead wood, Illinois, *Hall*. On *Librocedrus*, California, *Bolander*. On other coniferous trees, Washington Terr., *Suksdorf*.—The paler-fruited specimens are so far sufficiently marked; but appear scarcely separable.

†† *Thallus more or less fuscescent.*

36. *B. rivulosa*, (Ach.) Fr.; thallus tartareous, areolate-rimose passing now into verrucose, now glaucescent, cream-coloured, or grayish-rufescent, but more commonly mouse-coloured, or passing finally into blackish-brown, bordered and decussated by the black hypothallus; apothecia middling-sized, from sessile at length commonly adnate, or elevated? flattish, the disk with a thin, white bloom, or naked, from brownish-fleshcoloured soon blackening, white within, the thin, soon flexuous margin rarely excluded. Spores ovoid-ellipsoid, mostly a little curved, 9-12 by 3-5 mic.—*Fr. L. E. p. 271. Lecidea, Schær. Enum. p. 111 (Spicil. p. 131.)*

b. *mollis*, *Wahl.*; spores smaller, rounded-ovoid, 6-9 by 5-6 mic.—*Lecidea mollis*, *Nyl. Scand. p. 223. Th. Fr. Scand. p. 451.*

Rocks. Arctic America (*Richardson*) Hooker *l. c.* 1823. New England, *Tuckerman*. Pennsylvania, &c., *Muhlenberg*, &c. Mountains of North Carolina, *Herb. Willey*. Aiken, South Carolina, *Ravenel*.—b. alpine rocks, White Mountains, *Tuckerman*.—The v. *Kochiana*, Fr., (*Lecidea Kochiana*, *Nyl. l. c.*, *L. lygaea*, *Th. Fr. l. c.*) with a smoother, broken but scarcely areolate thallus, and apothecia more or less innate and soon immarginate, has not been observed here.

37. *B. leucophœa*, *Floerk.*; “thallus verrucose or verrucose-areolate, scattered or conglobate, cinerascent, upon a black hypothallus; apothecia small, adnate or appressed, persistently or long flat, with a thin margin, rufous-brown, brown or livid-black, or black, the exciple pale or more or less brownish, white within. Spores ellipsoid, or oblong, 9-14 by 5-7 mic.”—*Lecidea, Th. Fr. Scand. p. 458. Biatora panæola, Fr. L. E. p. 273, a. L. panæoloides, Nyl.*

Scand. p. 193.

b. *griseoatra*, Koerb. ; thallus thicker, gray or blackish-gray ; apothecia larger, often angulate or flexuous, blackish when dry, more or less dark-blackish-purple when moist, often polished. — *Th. Fr. l. c.*

Granite rocks in mountainous and arctic regions. Arctic America, (b) *Th. Fries* in *Journ. Linn. Soc. Lond.* 1879.

38. *B. fuscescens*, (Sommerf.) Fr. ; thallus sub-determinate, of minute, sparse, whitish granules, scattered over a blackening hypothallus which lends colour to the whole, but is now obsolete ; apothecia small to minute, superficial, plano-convex, brown soon blackening, the thin margin finally disappearing, the hypothecium colourless. Spores ellipsoid, or globular, "6-10 by 4-7 mic." — *Lecidea, Sommerf. Suppl. Lapp. p. 161. Biatora, Fr. L. E. p. 273.*

On the young bark of Birch (Sommerfelt ; Fries) and often trees and shrubs (Nylander ; Th. Fries) in the extreme north of Europe. Also in Greenland (*Vahl*) Th. Fries *l. c.* 1861 ; but not as yet known elsewhere in North America.

38. (b) *B. Paddensis*, Tuck., *in litt.* ; thallus of scattered, cartilaginous, at length flattened granules, glaucous, and white, the hypothallus indistinct ; apothecia middling-sized (0^{mm.}, 5-1^{mm.} in width) sessile, from flat when often persistently so and the margin finally flexuous, passing into convex and the margin disappearing, from pale tawny often livid passing into dark-red and blackish, the hypothecium colourless. Spores in 8^s, globular at length ovoid, simple, 6-10 by 6-7 mic., & finally more elongated, and c. 10-12 by 4-6 mic., the slender paraphyses conglutinate.

On dead, coniferous wood, Mt. Paddo, Washington Territory, *W. N. Suksdorf*, in herb. Sprague. — It is not easy to reduce this lichen to the tiny arctic one with which it is here associated, but the former is scarcely more than a coarser and higher-coloured state of *B. fuscescens*.

39. *B. Nylanderi*, Anz. ; thallus effuse, of very minute, ashcoloured and whitish granules ; apothecia small, at length

adnate, flat, but soon convex, excluding the originally pale margin, brownish-rufous, within pale. Spores globose, 5-7 mic. in diameter.—*Lecidea*, Th. Fr. Scand. p. 462. *L. fuscescens*, Nyl. Prodr. p. 117, not of Sommerfelt.

Bark of Pitch Pine, Cambridge, Mass., Tuckerman Gen. 1872. On the same bark, New Bedford, Willey.

40. *B. Tornoensis*, (Nyl.) Th. Fr.; thallus of flattened granules crowded and confluent into an irregular, now areolate-rimose crust, olivaceous-brown; apothecia small to minute, superficial, convex becoming irregularly tuberculate, and immarginate, sanguineous-rufous and blackening, pallid toward the base more or less, finally confluent into difform masses, pale within. Spores broad-ellipsoid, 17-25 by 10-17 mic.—*Lecidea* Nyl. Scand. p. 195. Th. Fr. Scand. p. 464.

On various trees and shrubs, and on dead wood in the extreme north of Europe. Also in Greenland (Vahl) Th. Fr. l. c. 1861; as elsewhere in Arctic America, the same, 1879. White Mountains, alpine regions, Willey. California, Bolander. Washington Territory, Suksdorf.—I have not seen the Greenland lichen, but all the other North American plants exhibit a well-developed thallus, by no means recognized in the European descriptions, although it appears in one of the specimens of Rabenh. exs. n. 879 (*B. phaeostigma*, Sweden, Hellbom) which in every other respect agrees with the present species. Hypothallus scarcely determinable in my specimens.

41. *B. holoplia*, Tuck., in litt.; thallus of coarse, round, discrete, or finally crowded, cartilaginous, olivaceous-brown, and blackening granules (0^{mm}, 1-3 wide) the hypothallus indistinct; apothecia middling-sized (0^{mm}, 5-1^{mm}, 5 in width) adnate, from flat with an obtuse margin finally convex, flexuous-lobate and proliferous, from ferruginous-rufous, soon blackening, the hypothecium colourless. Spores ovoid, guttated, 9-14 by 4-7 mic., the paraphyses conglutinate.

Dead wood in the Yakima region, Washington Territory, Suksdorf in herb. Sprague.

42. *B. uliginosa*, (Schrad.) Fr. ; thallus effuse, of scattered or heaped, commonly very minute granules, from dark-green passing into olive, finally rusty-brown, and blackish, on a blackening hypothallus ; apothecia small to minute, appressed, flat, but becoming convex, and often clustered, and confluent, from rufous-brown soon blackening, and the thin, pale margin concolorous and disappearing, the hypothecium blackish-brown. Spores from ovoid passing into ellipsoid, 9-15 by 4-7 mic.—*Fr. L. E. p. 275. Nyl. Scand. p. 198.*

On turf earth, sand, charred pine-stumps, and rotting wood. New England, *Tuckerman. Gen. 1872; Willey.* Anticosti, *Macoun.* New Jersey, *Austin.* Illinois, *Hall.* North Carolina, *Curtis.* South Carolina, *Ravenel.* Washington Territory, *Suksdorf.*

43. *B. myriocarpoides*, (Nyl.) ; thallus very thin, scurfy, olivaceous-brownish, or obsolete ; apothecia minute, adnate, from flat, and originally dark-livid-brown with a thin darker margin soon convex, turgid, and black, the hypothecium blackish-brown. Spores ellipsoid and fusiform-ellipsoid, 6-9 $2\frac{1}{2}$ -4 mic.—*Lecidea, Nyl. in litt.*

On dead Pine and other wood. Lower and upper country of South Carolina, *Ravenel.* Massachusetts, *Tuckerman.* New Hampshire, and New York, *Willey.* Vermont, *Frost.* On bark of Oak, Illinois, *Wolf.*

† † † *Thallus ochroleucus.*

44. *B. varians*, (Ach.) ; thallus of minute granules which grow together into a thin, cartilaginous, smooth, or granulate-rugose, finally chinky, pale-yellowish, or greenish crust, bordered and decussated by the black hypothallus ; apothecia very minute, (0^{mm.}, 15-0^{mm.}, 3 wide) adnate, flat, with a thin, demiss margin, but soon convex and immarginate, often clustered and confluent, from pale-yellowish passing into brown, rufous, and quite black, and the last now white-pruinose, colourless within. Spores ovoid and ellipsoid, 7-14 5-8 mic.—*Lecidea, Ach. Syn. p. 38. Biatora exigua (Chaub.) Fr. L. E. p. 278.*

On bark, very common ; and also on dead wood. North

America, *Acharius l. c.* 1814. New England, *Tuckerman*. New Jersey, *Austin*. Pennsylvania, *Michener*. Ohio, *Lea*. Illinois, *Hall*. Maryland, *Tuckerm.* North Carolina, *Curtis*. South Carolina, *Ravenel*. Alabama and Florida, *Peters*, &c. Louisiana, *Hale*. Texas, *Wright*.

45. *B. quernea*, (Dicks.) Fr. ; thallus effuse, of minute, crowded and heaped granules, from greenish becoming pale-brownish-yellow ; apothecia small, more or less immersed, from flat with a pale margin soon convex and immarginate, brownish-red, brown, and blackening, pale within. Spores broad-ovoid, exceptionally now reddish, 8-12 by 4-6 mic. — *Fr. L. E. p. 279. Lecidea, Th. Fr. Scand. p. 425. Pyrrhospora, Koerb. Syst. p. 209.*

On the bark of Pine, and other trees, California, (*Bolander*) *Tuckerman Gen. 1872*. The black hypothalline lines observable now in the European lichen have not, owing to the conterminous black-edged lichens with which ours grows, been clearly made out in the latter, but the two are quite the same. — A lichen of dead wood in the Mexican island of Guadalupe (*Dr. Palmer* in *herb. Willey*) differs in larger, more or less confluent, and not at all powdery granules, quite black but not otherwise distinguishable apothecia, and larger, though similar spores, 10-16 by 6-8 mic.

45. (b) *B. flavidolivens*, *Tuckerm. in litt.* ; thallus much as that of the last, and furnished now with black hypothalline lines ; apothecia also not dissimilar but olivaceous-livid. Spores oblong, 9-17 by 3-4 mic., often sub-bilocular.

On Hemlock, and other trunks ; and also rarely on rocks, New Bedford, *Willey* ; who remarks that the thallus is common, but occurs very seldom with fruit. The spores cannot well be reconciled with those of *B. quernea*.

46. *B. lucida*, (Ach.) Fr. ; thallus effuse, of minute scattered granules, which dissolve from the first, upon rocks, into a fine powder, collected now into little heaps, greenish-yellow ; apothecia small to minute, convex, lemon-coloured, becoming pale, and now brownish, and often conglomerate or confluent, the margin very early disappearing. Spores

oblong-ovoid, 4-6 by 2-3 mic.—*Fr. L. E.* p. 280. *Lecidea*, *Schær. Spicil.* p. 187. *Th. Fr. Scand.* p. 432.

Rocks, in shaded places, as also on the bare roots of trees, and dead wood. Arctic America, (*Richardson*) Hooker *l. c.* 1823. New Bedford, Mass., *Willey*. New York, *Peck*.

‡ ‡ ‡ ‡ *Thallus externally deficient.*

47. *B. calcivora*, (Mass., Nyl.) thallus confused with the calcareous substrate; apothecia small to minute, immersed, or emerging, and at length superficial, flat with a thin, irregular margin, or convex and the margin early disappearing, the disk dark-red (especially when wet) and blackening, the hypothecium rufous-fuscescent. Spores ovoid, 12-23 by 6-9 mic.—*Nyl. Prodr.* p. 135; *Lich. Par.* n. 138. *L. immersa*, *v. calcivora*, *Schær. Spicil.* p. 158, *pro. p.*; *Lich. Helv.* n. 201.

Calcareous rocks, Moulton, Alabama, *Peters*.—Various in the size, and the general exhibition of the apothecia; and in the dimensions of the spores. Our plant is now very like *B. Metzleri*, Koerb. *Parerg.* (*specim. p. 162 orig.*) but is this, any more than *Anz. Ital.* n. 267 ("*L. immersa*, f.") really to be separated in species?

‡ ‡ ‡ ‡ ‡ *Parasitic species.*

48. *B. oxyspora*. (Tul.); thallus foreign, but deformed by the parasite and thus passing into small tufts of mostly eucullate lobules; apothecia minute, immersed for the most part in the matrix, and flattened, from pale brown at length blackening, immarginate, the hypothecium brown. Spores fusiform-ellipsoid (lanceolate, *Tul.*) simple, colourless, 16-20 by 5-8 mic.—*Lecidea*, *Nyl. Prodr.* p. 145; *Scand.* p. 246. *Abrothallus*, *Tul. Mem. Lich.* p. 146, t. 16, f. 27.

On the thallus of *Parmelia Borreri*, Massachusetts, *H. Willey*. New Hampshire, *J. Blake*. Canada, *Macoun*.—The reaction of the hymenium with iodine is blue.

† † *Biatorina*. *Spores ovoid-ellipsoid, bilocular.*

‡ *Thallus glaucescent.*

49. *B. mixta*, Fr.; thallus cartilagineous, thin, soon granulate and at length rugose-verrucose, whitish; apothecia small to minute, adnate, disk flat, pruinose, from fleshcoloured passing into livid, and blackish, the obtuse, at first paler margin finally excluded, and the fruit turgid, pale within. Spores very various, from ellipsoid soon fusiform-oblong not seldom a little curved, 9-16 by 3-4 mic.—*Fr. L. E.* p. 268; & *Lich. Suec.* n. 40. *Tuckerm. Syn. N. E.* p. 61. *B. Griffithii*, Koerb. *Syst. p. 191. Lecidea tricolor*, Nyl. *Scand. p. 207. Th. Fr. Scand. p. 574.*

On living bark, and also, less commonly, on dead wood, New England, *Tuckerman l. c. 1848*; *Frost*; *Willey*. California, *Bolander*. Oregon, *Hall*.—The species, as here taken, is even more various than in the old world. A New England lichen on dead wood scarcely differs from the type, but the tree-form, though otherwise ill-separable, has spores scarcely other than simple; and may be called *v. Atlantica*. And the European lichen is even better represented generally by the plant of the west coast, which yet is distinguished by a limiting and decussating black hypothallus—*v. Pacifica*. The same structure appears, if I mistake not, in a Cape of Good Hope specimen (*Wright*) referable here.

†† *Thallus more or less ashcoloured.*

50. *B. atropurpurea*, (Mass.) Hepp; thallus effuse, very thin, membranaceous, soon scurfy, and granulate, and now sorediiferous, ashy-green and fuscous, or obsolete; apothecia small, at length adnate, disk flat, often papillate, and now a little convex, and the more or less tumid margin excluded, reddish-brown becoming blackish, pale within. Spores ellipsoid, 11-16 by 5-7 mic.—*Biatorina*, Koerb. *Parerg. p. 142. Catillaria, Th. Fr. Scand. p. 565. Lecidea intermixta*, Nyl. *Add. Chil. in Ann. 4, 3, p. 160, fide auct. L. intermixta, v. lignaria, Nyl. Scand. p. 194.*

On bark, and also on dead wood. New England (*Frost*) *Tuckerman Gen. 1872*; *Willey*. Illinois, *Hall*.

51. *B. Laureri*, (Hepp); thallus thickish, rimose, and rugose-verruculose, perhaps paler than in the last; apothecia soon

middling-sized, sessile, the roughish disk convex, from reddish-black soon quite black and lecideoid, the at first pale, smooth, demiss margin disappearing, the hypothecium blackish-brown. Spores ellipsoid and fusiform-ellipsoid, 12-23 by 4-8 mic.—*Catillaria*, *Hepp in Arn. exs. n. 353* (cit. *Th. Fr.*) & *Rabenh. exs. n. 804*. *Th. Fr. Scand. p. 582*. *Lecidea intermixta obscurior*, *Nyl. Prodr. p. 105*. *L. intermixta*, *Nyl. Scand. p. 194*.

On Beech, New England (*Frost, &c.*) common, Tuckerman *Gen. 1872*. Canada, *A. T. Drummond*. New York, *Peck*. California, *Bolander*. Oregon and Alaska, *Hall*; *Pringle, &c.*—Well distinguished from the last as well by the structure and habit of the apothecia as by the spores. In otherwise similar specimens from Chili (*Poepig*) the spores occur still larger, reaching 35 by 14 mic.

52. *B. glauco-nigrans*, Tuckerm. ; thallus of small, separate, rounded granules, becoming flattened and more or less coalescent, and from glauescent passing into ashcoloured ; apothecia small to minute, sessile, convex and immarginate, from livid-pale blackening, the border early disappearing, the hypothecium brownish-black. Spores ellipsoid, & oblong-ellipsoid, 6-11 by 2-4 mic.—*Obs. Lich. 4, l. c. 22, p. 179*.

Bark of White Pine, & Hemlock, New Bedford, Mass., *Willey*.—Comparable externally to the blackened conditions of the next.

53. *B. cyrtella*, (Ach., Nyl.) ; thallus thin, smooth, chunky becoming granulate, pale to dark-greenish-ashcoloured ; apothecia minute, soon convex and immarginate, from pale passing now into tawny and rufous and now into livid and blackish, the paler margin early excluded, within pale. Spores from ellipsoid soon oblong, simple or bilocular, 9-14 by 2½-3½ mic.—*Lecidea*, *Ach. Meth. p. 67*. *Nyl. Lapp. Or. p. 152*. *Lecanora*, *Th. Fr. Scand. p. 294*.

On bark, New England (*Frost*) Tuckerman *Gen. 1872*. New York, *Peck*.—The type, with me, of this species, is a blackish-fruited specimen from Vermont, determined many

years since by Dr. Nylander, which accords with the cited, original description of *Acharius*, and is more easily reckoned biatorine than lecanorine, notwithstanding the difficulty in its associableness with forms of *Lecanora athroocarpa*. A closer limitation of the two groups, as here exhibited, must be left to the future.

53. (b) *B. Franciscana*, Tuckerm. herb. ; thallus thick, tartareous, rugose-verrucose, ashcoloured ; apothecia middling-sized (1^{mm.}—1^{mm.}, 5 wide) sessile, flat, with a thick, uneven margin which is soon excluded, and the fruit turgid and variously tuberculate, black with a white bloom, pale within. Spores oblong, 13-23 by 3-5 mic.

Sandstone rocks, Oakland hills, and at the Cliff-house, San Francisco, California, Bolander.—The analogue here perhaps of *Mass. Ital.* n. 144 (*Biatora proteiformis*, v. *lecidina*, Mass.) but a coarser plant, and nothing has occurred answering to his n. 147 (v. *compacta*, Mass.) throwing important light on the first, and serving to connect it with the *B. erysibe*, Fr. (Th. Fr. *Scand.*, p. 295.) Still the Californian lichen is not wholly unlike our darkest *B. cyrtella* on bark, except in general coarseness, and larger spores.

54. *B. Heerii*, Hepp ; thallus of minute, rounded, heaped granules, greenish-cinerascent ; apothecia minute, sessile, flat, at first pale, but the disk blackening, and the obtuse margin soon concolorous, within pale. Spores ovoid, 7-11 by 3-6 mic.—*Lecidea*, Nyl. *Lapp. Or.* p. 152.

On the thallus of *Peltigeræ*, New Bedford, Mass., Willey, who has exhaustively determined it also in specimens from Illinois, Wolf; but the material is small. The difference of *Lecidea epigena*, Nyl. *l. c. p.* 149, also inhabiting the thallus of *Peltigeræ*, is scarcely well shewn.

55. *B. globulosa*, (Floerk.) Hepp ; thallus very thin, whitish, or obsolete ; apothecia small to minute, at length adnate, convex and immarginate, within colourless, the younger states now livid-pallescent, and the youngest flat and shewing a thin margin. Spores oblong, 9-12 by 2-3 mic.—*Lecidea*, Nyl. *Lapp. Or.* p. 149. *Catillaria*, Th. Fr. *Scand.* p. 575.

On dead wood of Coniferæ. White Mountains, *Tuckerman Gen.* 1872. British Columbia, *Macoun*. This last offers minute, white granules which are entirely like the same feature in Norrl. *Fenn.* n. 176, and Hepp n. 16. In the White Mountain lichen no thallus appears, as it is deficient also in *Moug.* & *Nestl.* n. 1830, determined by Nylander. In other respects both plants sufficiently agree with the foreign.

56. *B. prasina*, Fr.; thallus effuse, of very minute, soon heaped granules, from pale becoming dark-blackish-green; apothecia minute, convex, soon globular and immarginate, whitish soon livid, brownish, reddish, and black, pale within. Spores ovoid and oblong-ovoid, 7-13 by 2½-5 mic.—Hepp *Flecht. Eur.* n. 178. *Catillaria, Th. Fr. Scand.* p. 572. *Lecidea sordidescens*, Nyl. in *Flora*, 1874, p. 312.

Rotten wood of Coniferæ. Massachusetts, *Willey*. Illinois, *Wolf*. Georgia, *Ravenel*. Washington Territory, *Suksdorf*. —The *B. denigrata* from Cambridge, Mass., of the author's *Gen.* p. 161, was confidently so referred, in reliance on a specimen (in which I had not found spores) from Borrer, of his *Lecidea synothea* (E. Bot. t. 2711) which is cited as the same (specimens being seen) not only by Schäerer, *Enum.*, but also by Mudd, and Leighton; but Borrer's lichen proves uncertain (the spores of my specimen referring it in fact to *B. umbrina*) and our Cambridge plant is only a very dark *B. prasina*.

57. *B. micrococca*, Koerb.; thallus scurfy, and minutely granulose, pale-green and cineraceous; apothecia very minute, adnate, globular and immarginate, at length a little flattened, often conglomerate and confluent, from whitish soon livid-pale, or yellowish-pale, colourless within. Spores oblong-ovoid and ellipsoid, 7-13 by 2½-3½ mic.—Koerb. *Parerg.* p. 155. *Catillaria, Th. Fr. Scand.* p. 571.

Bark of Pitch Pine, New Bedford, Mass., *Willey*. And, scarcely distinguishable, but with stouter spores, 10-14 by 4-6 mic., on bark of White Cedar, Hingham, Mass., *Russell*.

† † † *Thallus ochroleucus*.



58. *B. flavens*, Willey; thallus thin, rimulose, ochroleucous; apothecia very minute, adnate, soon convex, wax-coloured, the thin margin disappearing, pale within. Spores from ellipsoid becoming oblong, 7-12 by 2-3 mic.—*Willey in litt.*

Granite rocks, New Bedford, Mass., rare. Very little is yet known of it. Spores now 3-locular.

††† *Bilimbia*. Spores fusiform, and finger-shaped, 4-9 locular.

‡ Thallus more or less glauescent.

59. *B. molybditis*, Tuckerm. herb.; thallus of minute, flattened granules coalescent more or less into a thin chinky crust, pale-leadcoloured; apothecia small to minute (not exceeding 0^{mm.}, 5) sessile, pale-yellowish-fleshcoloured, the stout margin equalling the disk, pale within. Spores fusiform, 4-locular, 11-22 by 3-5 mic.; the finally lax paraphyses capitulate.

On bark, Florida, *J. Donnell Smith*. Resembling *Gyalecta lutea*.

60. *B. Ravenelii*, Tuckerm. *in litt.*; thallus effuse, thin, of minute, crowded, greenish-glauescent granules; apothecia small to minute (scarcely exceeding 0^{mm.}, 5) sessile, concave and flat, pale-fleshcoloured, the thin margin elevated, within colourless. Spores long-ellipsoid and fusiform, 16-25 by 4-5 mic.; the slender paraphyses at length lax.

On sand-rock, Gainesville, Florida, *H. W. Ravenel, Esq.*

61. *B. cupreo-rosella*, (Nyl.) ; thallus effuse, granulose and verruculose, becoming also compacted and rimulose, greenish-gray, and whitish; apothecia small, at length adnate, soon convex and immarginate, and finally tuberculate-diform, pale—to yellowish—and reddish-fleshcoloured, the darker margin disappearing, colourless within. Spores from fusiform-ellipsoid becoming finger-shaped, and at length needle-shaped, 4-locular, 12-22 by 2-3 mic.—*Lecidea, Stizenb. Lich. sal. p. 9. Bilimbia Bacidioides, Koerb. Parerg. p. 167.*

On limestone, Orange Co., New York, *Austin*. Known as

yet here only in this specimen; and the character will probably need extension, at least in the colour of the thallus, the rosy tint so common in the European lichen not yet seen here. Connects the present section with the next following, to which it has also been referred.

62. *B. sphæroides*, (Dicks.) ; thallus of minute, heaped, more or less at length confluent granules, greenish-glaucous and cinerascent; apothecia small, turgid, sub-globose, at length clustered and confluent, from pale-fleshcoloured becoming tawny, and rarely rufescent, the thin margin early excluded, pale within. Spores ellipsoid passing into fusiform, 4-locular, 14-24 by 4-7 mic.—Upon turfy earth, and mosses on rocks, in high northern regions. Islands of Behring's Straits, *Wright*. British Columbia; near Lake Manitoba; & north Shore of Lake Superior, *Macoun*. Rocky Mountains, *Brandegee*. And even at the base of the White Mountains, *Willey*.

63. *B. hypnophila*, (Turn.) ; thallus of minute, crowded, at length now confluent granules, from green soon glaucous passing into ashcoloured; apothecia small to minute, now flat and marginate but more commonly convex becoming globular and immarginate, livid-pale, dirty-brownish, rust-coloured, sanguineous, and black, the hypothecium from colourless passing finally into dark-brown. Spores from ellipsoid at length fusiform, 4-9-locular, 14-30 by 4-8 mic.—*Bilimbia sphæroides*, max. p., *Koerb. Syst. p. 213.*

On mosses, stones, and on the earth, as also on dead wood, and living bark. Greenland (f. *obscurata*) (*Vahl*) e Th. Fr. l. c. 1861. Canada, and British Columbia, *Macoun*. More southward, common. New England, *Tuckerman*. New York, *Peck*. New Jersey, *Austin*. Ohio, *Lesquereux*. Illinois, and Kansas, *Hall*. Rocky Mountains, *Macoun*. And, closely related, on living bark, Florida, *Austin*.—It is not many years since the rank of this, and the species last preceding, as here received, was first conceded to them by lichenographers. But authors have since gone far the other way; Dr. Th. Fries (*Scand.* p. 369) making the eighteen species of his *Bilimbia* proper equivalent to one (the *Lecidea*

sphaeroides, *Scand.* p. 204) of Nylander. The group is purposely kept a large one here, for further study. Some of the recent determinations of members of the group, saluted now as species, will scarcely bear a close scrutiny. *Lecidea subfuscula*, Nyl. (*L. sabuletorum*, f. *venusta*, Stizenb. *Bacidia subfuscula*; Th. Fr.) is one of these, is cited from Greenland (Th. Fries) and may possibly be represented by a specimen from the northern shore of Lake Superior (*Macoun*) but the published character appears insufficient to distinguish it. Perhaps the next following may be of more account.

64. *B. Naegelii*, Hepp; thallus of flattened granules, running together into a chinky crust, ashy-greenish or whitish; apothecia small, adnate, much crowded together and clustered, convex and immarginate, from fleshcoloured becoming reddish-brown, and blackening, the paler margin soon excluded, the hypothecium pale. Spores fusiform-ellipsoid, scarcely more than 4-locular, 16-23 by 4-6 mic.—*Lecidea*, Stizenb. *Lich. sab.* p. 19. *Bilimbia*, Th. Fr. *Scand.* p. 378. *B. faginea*, Koerb. *Syst.* p. 212.

On dead wood (at least not differing except in the substrate from *Anz. Venet.* n. 58) and also, according to the discoverer, on living bark, New Bedford, Mass., *Willey*.

65. *B. trachona*, Flot.; thallus scurfy, now passing into granulose, and now becoming contiguous and chinky, pale to dark-greenish-ashcoloured; apothecia small to minute, adnate, now flat and blackish-brown with a paler margin, or black with a concolorous one, or at length cephaloid and immarginate, the hypothecium blackish-brown. Spores fusiform-ellipsoid, and finger-shaped, 4-locular, 12-20 by 3-6 mic.—*Lecidea*, Stizenb. *Lich. sab.* p. 58. *Biatora*, Koerb. *Syst.* p. 197, & *Bilimbia coprodes*, Parerg. p. 166.

On shaded rocks. Massachusetts, *Tuckerman Gen.* 1872; *Willey*. New York, *W. R. Gerard*. Also on dead wood, New Bedford, Mass., *Willey*.

66. *B. verecundula*, (Th. Fr.); “thallus very thin, whitish, or almost obsolete; apothecia exceedingly minute, sessile, flat, black, naked, with a thin margin, the hypo-

thecium colourless. Spores linear-oblong, obtuse at both ends, 4-locular, 12-16 by 3-4 mic., the soon free paraphyses conspicuously brown-capitulate."—*Th. Fr. in Journ. Linn. Soc. Lond. 17, p. 359; Scand. p. 387.*

Upon mosses, Grinnell Land, Arctic America, *Th. Fries*, *l. c.* 1879.—The original lichen of Finmark occurred on Poplar.—The species next following agrees and differs in several respects.

67. *B. declinis*, Tuckerm. ; thallus thin, scurfy, greenish-fuscescent ; apothecia minute (scarcely exceeding 0^{mm.} 2-3 mic. in width) appressed, flat, originally brownish but soon blackening and excluding finally the thin margin, the hypothecium pale fuscescent, the at length distinct paraphyses reddish-brown-capitulate. Spores from ellipsoid becoming finger-shaped, 2-4-locular, 5-9 by 2½-3½ mic.—*Lecidea*, *Tuckerm. Gen. p. 182.*

On various barks, Weymouth, and New Bedford, Mass., *Willye*. Sent to me as a variety of *Lecidea acclinis*, Flot. ; but fuller material removes it from near relation to that lichen. It is comparable rather with the two last preceding species.

68. *B. artyta*, (Ach.) ; thallus of thickish, cartilaginous, flattened, separate granules which are soon dilated, squamaceous, and sub-lobulate, and run together into an uneven, glaucescent, or cinerascent crust ; apothecia small (0^{mm.}, 3-7 wide) sessile, soon convex, hemispherical, and immarginate, often clustered, from pale-livid passing into blackish-brown, and black, opake, the hypothecium brown. Spores finger-shaped, 4-locular, 14-24 by 4-6 mic.—*Tuckerm. Gen. p. 162. Lecidea*, *Ach. L. U. p. 170; Syn. p. 214, e descr. Bilimbia sabulosa*, *Koerb. Syst. p. 214; & B. Regeliana*, *Koerb. Parerg. p. 168. Lecidea sabuletorum*, *v. syncromista*, *Stizenb. Lich. sab.*, *p. 38. Toninia syncromista*, *Th. Fr. Scand. p. 335.*

On the earth, in high northern regions. Islands of Behring's Straits (*Wright*) Tuckerman *Gen. 1872. Rocky Mountains, Brandegee*.—What Acharius described as his *Lecidea artyta* was a Swiss lichen from Schleicher. This was

known to Schærer (*Spicil.* p. 151) who referred it to his *L. sabuletorum* *b* *muscorum* (the above-cited *f. syncromista* of Stizenberger.) And Schærer also published this in his *Exsiccati* (*Lich. Helv.* n. 194, *p.p.*) and it is the only one of the two discordant plants under this number which really accords with his citation of Acharius. It is certainly then significant that this same plant (the *v. muscorum* of the Swiss lichenographer, which he declared to be what Schleicher sent Acharius, and the latter called *L. artyta*) stands now (according to Dr. Th. Fries *l. c.* p. 336, *obs.*) for *L. artyta* in the Acharian herbarium; and that the cited original description in Ach. *L. U.*, sufficiently exhibits it. How certain specimens of *Stereocaulon* (Th. Fr. *l. c.*) not mentioned, and far enough from having been described by Acharius, can yet be "primary" sources of the species before us, it is difficult to see.—*B. artyta* belongs naturally with the present section of *Biatora*.

69. *B. milliaria*, (Fr.) ; thallus effuse, of separate, or confluent granules running together at length into a rugose-verruculose crust, or scurfy, or disappearing, brownish-ash-coloured, or whitish ; apothecia small to minute (0^{mm.}, 3—0^{mm.}, 7 wide) sessile and immixt, globular, the originally flat disk soon convex and excluding the demiss margin, blackish and black (or now livid-decolorate) commonly clustered, and confluent, the hypothecium pale. Spores finger-shaped and fusiform, 4-8-locular, 20-40 by 5-8 mic.—*Lecidea*, *Fr.* *L. E.* p. 342, *p.p.* *Tuckerm.* *Syn. N. E.* p. 68. *Th. Fr.* *Scand.* p. 381. *L. sabuletorum*, *v. milliaria*, *Stizenb.* *Lich. sab.*, p. 44.

On rotten wood, coast of Mass., *Tuckerman l. c.* 1848 ; as also on dead mosses, and other vegetable matter in the White Mountains, N. H., *Same.* Vermont, *Farlow.* California, *H. Mann.*

70. *B. melæna*, (Nyl.) ; thallus effuse, very thin, scurfy, or granulose, from grayish-green at length brown, or obsolete ; apothecia minute (0^{mm.}, 3—0^{mm.}, 5 wide) sessile, sub-globose, immarginate, coal-black, clustered, the hypothecium dark-reddish-brown. Spores ellipsoid becoming finger-shaped, 4-

locular, 10-16 by 4-6 mic.—*Lecidea*, *Nyl. Stizenb. Lich. sab. p. 54. Th. Fr. Scand. p. 384.*

Rotten and charred wood in the White Mountains, N. H., and on the coast of Massachusetts, *Tuckerman*. Differing from the last in its quite black fruit, blackening hypothecium, and small, constantly 4-locular spores. Both were referred by Fries to *Lecidea*; but, in view of their internal characters, find a better place here.

71. *B. tricholoma*, Mont. ; thallus thin, scurfy, light to dark-grayish-green, and fuscescent ; apothecia minute, adnate, flattish, but the opake disk soon a little convex, and from pale-brown passing into brownish-black, bordered by a pale, soon obsolete margin, which is encircled with a white (now rufous) filamentous fringe, the hypothecium brownish-black. Spores fusiform-ellipsoid and finger-shaped, 4-locular, 10-16 by 3-5 mic.—*Mont. Guy. p. 35. Tuckerm. Gen. p. 162. Lecidea leucoblephara, Nyl. in Prodr. N. Gran. p. 54, not. ; & Lich. Husnot, p. 45.*

Bark of Berchemia, &c., in the low country of South Carolina (*Ravenel*) *Tuckerman*, *l. c. 1872. Florida, Austin.* —It seems scarcely doubtful that the lichen described by Nylander is the same with Montagne's. The plant of the latter author was epiphylline, as Mr. Wright got it (though also on bark) in the island of Cuba.

† † † *Thallus ochroleucus.*

72. *B. Floridana*, *Tuckerm. herb.* ; thallus of very minute, soon confluent, sub-squamaceous and sub-imbricate granules, pale-yellowish-green ; apothecia minute (0^{mm.} 1—0^{mm.} 4 wide) appressed, disk flat, often papillate, reddish-flesh-coloured, with a thin, paler margin, at length convex and proliferous-irregular, pale within. Spores finger-shaped, 4-locular, 9-15 by 2 $\frac{1}{2}$ -4 mic.

Trunks, Caloosa river, Florida, *Austin* ; *Curtiss.*

† † † *Bacidia.* Spores needle-shaped, 4-plurilocular. The section is, like the others determined only by the spores, an artificial one ; but the group is natural, and constitutes

the (subordinate) stock of *B. rubella*, to which species a considerable part of the named lichens of the group are most intimately related. As respects the colour of the thallus, they all belong, with exceptions which more knowledge may explain, to the fuscescent series.

73. *B. microphyllina*, Tuckerm.; thallus squamulose, the minute scales cartilaginous-membranaceous, crenate-cut and laciniate, ascendant, from pale-ashy-greenish becoming brownish; apothecia small to almost middling (scarcely surpassing 1^{mm.} wide) flat, from yellowish soon reddish, the margin obtuse and at length flexuous, or now thinning and disappearing as the disk becomes convex, at length proiferous. Spores slender, pauci-locular, 20-28 by 2-2 $\frac{1}{2}$ mic. — *Lecidea*, Tuck. *Obs. Lich. 3, l. c. 6, p. 278, a, & b; & in Wright Lich. Cub. n. 211, 212.* *L. microphyllina*, & *L. tryptophyllina*, Nyl. in *Prodr. N. Gran. p. 62, note.*

Trees in the island of Cuba (*Wright*) Tuckerman, *l. c.* 1864. Related so intimately to the five lichens next following, that the whole are seen to constitute but a single (subordinate) stock, of which the forms described are doubtless only partial representatives. In *B. microphyllina*, b, the spores were noted by me as shorter than in a, and the same view of them is taken by Nylander, *l. c.*, who has elevated this form to the rank of species; but a fuller examination shews no real difference in this respect, and b, in fact, now offers the longest spores—sometimes almost twice exceeding the length given above.

73. (b) *B. leucophyllina*, (Nyl.) ; thallus as in a, but reduced, and soon white, and becoming deliquescent and sorediiferous; apothecia minute (scarcely exceeding 0^{mm.}, 5, in width) pale. Spores reduced, 15-20 by 1-1 $\frac{1}{2}$ mic. — *Nyl. l. c. L. microphyllina, c, Tuck. l. c., & in Wright Lich. Cub. n. 213.*

Trees in the island of Cuba (*Wright*) Tuckerman, *l. c.*, 1864.—However marked, this is quite inseparable from conditions of a, except by the characters of reduction; scarcely sufficient in this tropical group.

73. (c) *B. subgranulosa*, Tuckerm. *herb.*; thallus reduced to

cartilaginous granules, finally confluent into an uneven crust, with the varying coloration of a ; apothecia larger, becoming ample (1^{mm.}, 5 to 3^{mm.} wide) and also darker, and even black, the hypothecium exhibiting a similar variation. Spores 24-34 by 1 $\frac{1}{2}$ -2 mic.—*Lecidea microphyllina*, b, Tuck. l. c., & in *Wright Lich. Cub.* n. 214, 215, 216, 217, 218. *L. cognata*, & *L. pertexta*, Nyl. l. c. ; & *L. vestita*, Nyl. in herb.

Trees in Cuba (*Wright*) Tuckerman l. c. 1864. And the same, but with longer, and plurilocular spores (30-46 by 2-2 $\frac{1}{2}$ mic.) at Darien, Georgia, *Ravenel*.—The variations in colour of the hypothecium resemble those of the stock of *L. rubella* proper, noticed by me elsewhere (*Gen.* p. 165) nor does it seem possible at present to take much systematic account of these differences any more than in *B. hypnophila*, as here taken. The hypothallus is noted by Nylander, l. c., as blackening, in one of the published Cuba lichens ; but my material does not enable me to turn this to account. *B. vestita*, Mont. Cuba, p. 195, described as possessing ovoid spores comparable with those of *B. mutabilis*, is wholly uncertain, but what he gave me for it is very close to *Lecidea spadicea*, Ach., as Nylander also reckons Montagne's lichen nearest to *L. cognata*, Nyl.—As to the dimensions of the spores, the Georgia lichen varies from that of Cuba only as *B. microphyllina*, a, is above noted as varying.

73 (d) *B. Caloosensis*, Tuckerm. *herb.* ; thallus of minute, cartilaginous granules becoming confluent and sub-squamaceous, but passing finally into a granulate crust, from pale-green at length cinerascent ; apothecia minute (scarcely surpassing 0^{mm.}, 5 in width) pale-yellowish and reddish, the hypothecium pale. Spores oblong-ellipsoid, and finger-shaped, passing into fusiform, and staff-shaped, 10-24 by 2-4 mic.

Upon bark on the Caloosa river, Florida, *Austin*.—The spores appearing now to refer the lichen to the last section ; but finally—the whole habit of the plant being taken also into consideration—indicating it as a member of this.

73. (e) *B. prasinata*, Tuckerm. *herb.* ; thallus of minute, crowded and heaped, granules, pale-green ; apothecia at

length middling-sized (0^{mm.} 7—1^{mm.}, 5 wide) from yellowish becoming reddish, the hypothecium pale. Spores filiform, flexuous, commonly 4-locular, 60-88 by 1½-2 mic.—*B. prasina*, Mont. & Tuck. in Ann. 4, 8, p. 296, not of Fries.

Upon bark, Venezuela, *Fendler*.—Only another evidence of that tropical luxuriance which must qualify systematic judgments:—the lichen being distinguished only by the greater length of the spores; as *B. Caloosensis* by their precedence from the type of the section, and shortness.

74. *B. Augustini*, Tuckerm. *herb.*; thallus squamulose, the minute scales crenate-lobulate, expanded and stellate or crowded and imbricate, livid-ashcoloured and brownish, upon a black hypothallus; apothecia small (0^{mm.}, 7—1^{mm.} wide) the disk flat and livid-pale becoming fulvous-reddish, bordered by an uneven, soon demiss, and disappearing black margin, the hypothecium pale. Spores slender, from simple commonly becoming 4-locular, 30-40 by 1½-2 mic.

On bark, with *B. Caloosensis*, Florida, *Austin*. Not a little resembling a *Pannaria* akin to *P. microphylla*, & *P. tryptophylla*. It is dedicated, as our finest known North American species of the present section, to its prematurely-lost discoverer, the keen-eyed Coe F. Austin.

75. *B. rubella*, (Ehrh.) Rabenh.; thallus of scattered, or at length crowded, and finally more or less confluent granules, from pale-yellowish becoming greenish-ashcoloured; apothecia middling-sized, sessile, disk yellowish-reddish becoming dark-brownish-red, soon tumid, and excluding the obtuse, irregular margin, which is now suffused with white (f. *porriginosa*, Ach.) the hypothecium from pale passing into yellowish-brown. Spores plurilocular, 46-56 by 3-4 mic.—*Lecidea*, Schær. *Spicil.* p. 168. *Secoliga*, Stizenb. *Krit. Bemerk.* p. 47. *Bacidia*, Th. Fr. *Scand.* p. 344.

Upon bark, North America, *Muhlenberg Catal.* 1818. Arctic America, *Richardson*. New England, *Tuckerman*; *Russell*; *Willey*. Illinois, *Hall*. My specimens are not numerous, but the lichen can hardly be uncommon. Spores at length longer in the European lichen; and probably also in ours.

75. (b) *B. fusco-rubella*, (Hoffm.) ; thallus cartilagineous, granulate, becoming rugose and chinky, greenish-ashcoloured, the hypothallus finally blackening ; apothecia small to middling-sized (0^{mm.}, 7—1^{mm.}, 5 wide) sessile, from flat when the margin is more or less transversely striate, and at length often suffused with white and finally blackening also, and the disk often papillate, becoming at length turgid, from pale to dark-brownish-chestnut at length livid, rust-coloured, and black, the hypothecium finally dark-yellowish-brown. Spores much as in a, 40-70 by 3-4 mic.—*Bacidia*, Th. Fr. *Scand.* p. 346. *Secoliga*, Stizenb. l. c. p. 53 (excl. b.) *Lecidea spadicea*, Ach. *Syn.* p. 34. *Tuckerm. Syn. N. E.* p. 60.

Trees, North America, *Acharius* l. c. 1814. Throughout the United States and Canada. Northern and middle States, *Muhlenberg*. Ohio, *Lea*. Illinois, *Hall*. Carolinas, *Curtis*; *Ravenel*. Florida, *Sprague*. California, *Bolander*. And extending to tropical America, *Wright*, &c.

75. (c) *B. suffusa*, Fr. ; thallus and hypothallus as in *B. fusco-rubella* ; apothecia middling-sized to ample (1^{mm.}—2^{mm.}, 5 wide) flattish, the stout, striate margin finally now excluded by the turgescent disk, reddish-brown, and blackening, suffused entirely, or the margin at least, with white, within pale, but the hypothecium finally fuscescent. Spores quite as in the last, unless often slenderer, 40-70 by 2½-3½ mic. —*Fr. S. O. V.* p. 285. *Tuck. Lich. exs. n. 135*. *B. rubella*, v. *suffusa*, *Tuck. Gen. p. 166*.

Trees, North America, *Fries* l. c. 1825. With probably the same range as the last, but not yet seen from the Pacific coast. Canada, *A. T. Drummond*. New England, *Tucker-man*. New Jersey, *Austin*. Pennsylvania, *Michener*. Ohio, *Lea*. Illinois, *Hall*. Texas, *Hall*. And also on lime-rocks, Vermont, *Frost*; New York, *W. R. Gerard*. The size, and darker colour, and especially the marked suffusion of the fruit distinguish this, which agrees however in the frequently papillate apothecia with the last, as, in some degree of suffusion, with both the last preceding.

75. (d) *B. Schweinitzii*, Fr. ; thallus of rounded, soon

crowded and heaped granules, which are also now early compacted into a rimose-verrucose crust, from bright becoming dark and olivaceous-greenish, and ashcoloured, the hypothallus as in the two next preceding; apothecia small to middling-sized, and ample (0^{mm.}, 7—1^{mm.}, 5 wide) sessile, flat soon a little convex, the thick, furrowed, paler margin becoming smooth, and concolorous with the (originally wax-coloured, and reddish, but soon and commonly) dark-livid-brown, and pitch-black, opake disk, at length flexuous-lobate, the hypothecium in like manner varying from pale-yellowish to reddish and blackish-brown. Spores similar generally to those of the last, 42-60 by 2-3 mic.—*Fr. herb. Tuckerm. in Darlingt. Fl. Cestr., edit. 3, p. 447, & in Lich. exs. n. 136. B. rubella, v. Schweinitzii, Tuck. Gen. p. 166. Patellaria granulosa, Michx. Fl. Amer. 2, p. 320, fide Mill. Lich. Beitr. in Flora, 1878, n. 31. Rhaphiospora, Müll. l. c.*

Trees, North Carolina, *Michaux*, *l. c.* 1803. South Carolina, *Ravenel*. Alabama, *Beaumont*. Arkansas, *Peters*. Texas, *Hall*. But attaining, apparently to its finest conditions northward. Ohio, *Lea*. Virginia to New England, *Tuckerman*. Canada, *A. T. Drummond*.—It appears impossible to question the close relation of this lichen to the two preceding, and the present stock; and no startling discrepancies in structure in it are therefore to be expected. The gonia observed by Müller (*l. c.*) in the thallus of *B. Schweinitzii* can scarcely then be characteristical. I find true gonidia in all the specimens which I have examined. As in other forms of the present group longer spores than those above noted sometimes occur.

75. (e) *B. atrogrisea*, (Delis.) Hepp; thallus thin, smoothish, becoming chinky and granulate-rugose, greenish-ashcoloured, the hypothallus as in the last; apothecia small to middling-sized, sessile, soon convex, the disk from blackish-chestnut soon black, and the margin concolorous, nearly colourless and for the most part continuing so within, but the hypothecium at length pale-yellowish or reddish. Spores plurilocular, 30-50 by 2½-4 mic.; the paraphyses, as in the other lichens nearest to *B. rubella*, at length rather lax.—*Secoliga, Stizenb. l. c., p. 62. Bacidia endoleuca, Th. Fr. Scand. p. 347.*

On bark, southern and Pacific States, *Tuckerman Gen.* 1872. Georgia, *Ravenel*. Alabama, *Peters*. Florida, *Austin*. Louisiana, *Hale*. Mexico, *Nylander*. California, *Bolander*. The spores best agree in dimensions with those of Nylander's original Chilian lichen; as with others of specimens before me from the same coast (Hassler Exp.)—The European plant offers longer ones.

75. (f) *B. inundata*, Fr. ; thallus effuse, scurfy, at length compacted and rimose-subareolate, greenish soon pallescent; apothecia minute (0^{mm}, 3—0^{mm}, 5 wide) sessile or adnate and now innate, disk from flat soon convex, livid-pale, yellowish to reddish-fleshcoloured, livid-brownish, and black, excluding at last the paler but finally concolorous margin, the hypothecium from pale soon yellowish-brown. Spores very slender, 20-36 by 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ mic. ; the paraphyses in this, and the following members of the group scarcely becoming lax. —*Secoliga*, *Stizenb.* l. c. p. 33. *Bacidia Arnoldiana*, *Koerb.* *Parerg.* p. 134.

On various rocks, especially such as contain lime; as also on brick; and dead wood exposed to inundation. New England (*Frost*) *Tuckerman Gen.* 1872; *Willey*. New York, *Willey*. New Jersey, *Austin*. Pennsylvania, *Michener*. Ohio, *Miss Biddlecome*. Illinois, *Hall*. South Carolina, *Ravenel*. On soggy wood in the mountains of New Hampshire, *Tuckerman*; *Willey*.

75 (g) *B. effusa*, (Sm.) Hepp; thallus thin, scurfy, at length compacted and chinky, whitish or greenish-ashcoloured; apothecia small to minute, adnate, soon convex and proliferous-tuberculate, from waxy-brown becoming pale-flesh-coloured, the concolorous margin soon disappearing, the hypothecium pale-yellowish. Spores very slender, obsoletely plurilocular, about 20-40 by 1 $\frac{1}{2}$ -2 mic.—*Lichen effusus*, Sm. *E. Bot.* 1863, *upper fig.*, *fide Borr!* *in herb.* *Taylor*. *Bacidia phacodes*, *Koerb.* *Parerg.* p. 130. *Secoliga arceutina b*, *albescens*, *Stizenb.* l. c. p. 43. *Bacidia albescens*, *Th. Fr. Scand.* p. 348.

b. arceutina, Ach. ; apothecia small to minute (at length nearly reaching 1^{mm} wide) sessile, from pale becoming dark-

livid-brown, the demiss, darker margin disappearing, the hypothecium as in a. Spores very slender, flexuous, obsoletely plurilocular, 34-54 by $1\frac{1}{2}$ -2 mic.—*Lecidea luteola*, v. *arceutina*, Ach. *Meth. p. 61*, *fide Th. Fr. Secoliga arceutina*, a, *Stizenb. l. c. Bacidia*, *Th. Fr. Scand. p. 352*.

On various barks, New Bedford, Mass., *Willey*. California, *Farlow*, the first determined here of these two lichens; a occurring as yet only on hemlock, but b more commonly. With obvious differences in colour, both agree in the ultimate condition of the fruit, which is tuberculate, in consequence apparently of proliferous luxuriance. The English lichen is quite clear, but is readily associative with b, to which alone, it is evident, the description of *Acharius* is applicable. *Bacidia phacodes* of *Anzi Lich. Etrur. n. 25*, illustrates the relation of the two; one of the specimens belonging to our a, under which the whole is cited by *Stizenberger*, but the other, (in my copy) shewing no difference from *Hepp*, n. 24, which is our b, and as such recognized by *Stizenberger*.

75. (b) *B. stigmatella*, Tuckerm.; thallus effuse, mealy-granulose, from pale-greenish at length ashcoloured; apothecia minute (0^{mm.}, 2—0^{mm.} 4 wide) sessile becoming adnate, flat, but also convex and the margin finally excluded, from fulvous and dark-reddish soon livid-brown, and black, the hypothecium pale-yellowish. Spores slender, 22-32 by $1\frac{1}{2}$ -2 $\frac{1}{2}$ mic.—*Gen. p. 167, note.*

On bark, Louisiana (*Hale*) Tuckerman, *l. c.*, 1872. Not well referable to the last. I associate with it lichens from Texas, *Wright*; Florida, *J. Donnell Smith*; and Illinois, *Hall*; all agreeing in the mealy thallus, and minute, flattish apothecia, but these, in the Texan plant reaching 0^{mm.}, 5 in width, and the spores 36-46 by 2-2 $\frac{1}{2}$ mic.

75. (i) *B. Beckhausii*, (Koerb.) ; thallus much as in *B. effusa* b, *arceutina*; apothecia, as seen, very minute (0^{mm.}, 2—0^{mm.}, 3 wide) soon convex and immarginate, from pale-brownish, and pale-livid, blackening, with a thin, white bloom, the hypothecium colourless. Spores very slender, pauci-locular, 20-30 by $1\frac{1}{2}$ -2 mic.—*Bacidia*, *Koerb. Parerg. p. 134*. *Th. Fr. Scand. p. 359*. *Biatora stenospora*, *Hepp*

Flecht. Eur. n. 516. Secoliga Beckhausii, Stizenb. l. c. p. 21. Lecidea umbrina, v. poliæna, Nyl. Scand. p. 210, fide Th. Fr.

Upon Beech, Massachusetts, *Willey*.—Inserted only provisionally to help further study of the group. The at least pale hypothecium, and the smaller spores (so far as seen) are not strong characters to separate it from *B. effusa*, *b*, and the main difference is the bloom. Our plant is not well comparable with Nyl. *Paris.*, n. 130, which is referred here, on the author's authority, by Stizenberger, *l. c.*; but scarcely differs at all from the cited and unquestioned lichen of Hepp.

75. (k) *B. incompta*, (Borr.) Hepp; thallus effuse, coarsely mealy, but in the specimens mostly thin, or evascent, whitish, or now greenish; apothecia, as seen, minute (scarcely exceeding 0^{mm}., 5 wide) adnate, flat, with a thin, flexuous margin (characteristical in *B. incompta*) but finally convex, black, the hypothecium reddish-brown. Spores shortish, pauci-locular, 16-30 by 1½-3 mic.—*Secoliga atrosanguinea*, *Stizenb. l. c. p. 16*.

Bark, New England, *Willey*. New York, *W. R. Gerard*. Illinois, *Hall*. I follow Stizenberger's view of this lichen; only preferring the oldest, and well-known name.—With more knowledge we may have to give some distinction to a var. *atrosanguinea* (*Bacidia atrosanguinea*, a, Th. Fr. *Scand.* p. 354.)—The reddish-brown hypothecium is represented sometimes, in our plants, by a paler one, as in the v. *Hegetschweileri*, *Stizenb.*—*Biatora leucampyx*, *Mihni litt.*, from Beech, in Western Massachusetts, is a much coarser lichen, with thickish, pale-ashy-greenish thallus, sessile, black apothecia (0^{mm}., 5—0^{mm}., 8 wide) with a stout, uneven margin which is suffused with white, a dark-reddish-brown hypothecium, and larger spores, 24-44 by 2-3½ mic.; I have seen but little of it.

75. (l) *B. akompsa*, Tuckerm. *herb.*; thallus effuse, from scurfy at length compacted and rimose, smoothish or rugose-verruculose, pale-ashcoloured; apothecia minute (rarely exceeding 0^{mm}., 5 in width) sessile, from flat with an uneven, thin margin, soon convex and cephaloid, black, the disk

scabrous, the hypothecium pale. Spores short, pauci-locular, 18-24 by $1\frac{1}{2}$ - $2\frac{1}{2}$ mic.

On *Pinus insignis*, coast of California, *Bolander*. A fragment of what appears the same has been received by me, purporting to be *Lecidea Patellariooides*, Nyl., but cannot be what is described under that name in Nyl. *Scand.* p. 211. The plant looks much like the Californian specimens of *B. atrogrisea*. It differs from *B. incompta* in the hypothecium; but less in the spores.

75. (m) *B. Jacobi*, Tuckerm. in *litt.*; thallus sub-tartareous, rugose-verrucose, so far as seen, white; apothecia small to minute (0^{mm.}, 4—0^{mm.}, 7 wide) appressed, flat or flattish, quite black, a demiss, concolorous margin scarcely to be made out, the hypothecium blackish-brown. Spores plurilocular, 20-36 by 2-3 $\frac{1}{2}$ mic.

Trees, San Diego, California, *Dr. Palmer* in herb. *Willey*. Distinct looking, but the specimen is scarcely sufficient; and only characterized to draw attention to it.

75. (n) *B. muscorum*, (Sw.) ; thallus thin-subcartilaginous, rugose-verruculose, greenish-ashcoloured and whitish; apothecia small to middling-sized (0^{mm.}, 5—1^{mm.}, 3 wide) sessile or at length adnate, flat and thin, with a thin, now flexuous margin, but becoming convex and immarginate, and finally conglomerate and tuberculate, reddish-brown passing at once into black, the hypothecium from yellowish at length reddish brown. Spores slender, 24-40 by 2-3 mic.—*Secoliga pezizoidea*, *Stizenb.* *l. c. p. 13.* *Lecidea umbrina* * *bacillifera*, *v. muscorum*, *Nyl. Scand. p. 210.* *Rhaphiospora viridescens*, *Koerb. Parerg. p. 239.* *Bacidia atrosanguinea*, *v. muscorum*, *Th. Fr. Scand. p. 354.*

Upon the naked earth, and running there over mosses, &c. New England, *Tuckerm. Gen.*, 1872. New York, *Willey*. Minnesota, *Lapham*. Islands of Behring's Straits, *Wright*.

75. (o) *B. umbrina*, (Ach.) ; thallus effuse, scurfy, passing into flattened granules which are finally compacted into a thickish, uneven, rimose-areolate crust, from pale-ashy pass-

ing into blackish-green; apothecia minute (scarcely surpassing 0^{mm.}, 5 in width) mostly adnate, or innate, originally flat, with a paler margin, but soon and most commonly convex, turgid, and immarginate, from pale-livid-brownish becoming reddish-brown, and black, the hypothecium pale-yellowish. Spores hamate, and S-shaped, pauci-locular, 18-24 by 2½-3 mic. — *Secoliga*, *Stizenb. l. c. p. 26.* *Th. Fr. Scand. p. 365.*

On stones and rocks. New England, common (*Russell*) *Tuckerman Gen. 1872.* New Jersey, *Austin.* Virginia, *Curtis.* North Carolina, *Ravenel.* Common also on old rails (*v. compacta*, *Stizenb.*) on the New England coast, *Tuckerman*, &c. And occurring, in the same region, on living bark, *Willey*, &c. Our common rock-lichen agrees better with the European *v. turgida*, as to the spores, but differs from this in the more commonly black apothecia. — There seems to be scarcely sufficient reason for emphasizing the curvature of the spores (*Scoliciosporum*, *Mass.*) in any other member of the *rubella*-stock, than the present.

76. *B. chlorosticta*, *Tuckerm.*; thallus of minute, smooth, scattered granules, finally now flattened, or passing even more or less into a rugose-granulate crust, greenish-glaucous, and cinerascent; apothecia very minute (0^{mm.}, 1—0^{mm.}, 3 wide) elevated-sessile readily becoming short-stipitate, convex from the first and sub-immarginate, from livid-pale soon and commonly black, and somewhat polished, commonly clustered, the hypothecium finally blackish-brown. Spores slender, 2-4-locular, 14-30 by 1½-2½ mic. — *Gen. p. 167.* *Lecidea, Lich. exs. n. 139;* *Obs. Lich. 2, l. c. 5, p. 419.*

On bark of White Cedar, coast of Massachusetts, *Tuckerman, l. c. 1855.* On Pine and Bald Cypress-bark in the low country of South Carolina, *Ravenel.*

77. *B. chlorantha*, *Tuckerm.*; thallus of coarse, separate granules, finally flattened, and passing then more or less into a rimose crust, bright green and pallescent, or now finally fuscescent, upon a black hypothallus; apothecia small to middling-sized (0^{mm.}, 5—1^{mm.}, 5 wide) sessile, flattish, from dark-reddish-brown soon quite black, with a stout, at length crisped and flexuous, paler margin, at length proliferous,

within pale, the hypothecium colourless. Spores plurilocular, 23-34 by 2-3 mic., numerous (30-50) in the thekes. — *Syn. N. E. p. 60; Gen. p. 167.*

On White Pine, Fir, and Birch, on the coast of Massachusetts, and in the White Mountains, *Tuckerman, l. c. 1848*; as, on other trees, and shrubs, *Willey. New York, Peck.* And rarely on granitic rocks, New Bedford, Mass., *Willey.* Canada, on Spruce bark, *Macoun.*

*** *Biatorella.* Spores minute, and very minute; numerous, and exceedingly numerous, in the thekes.

78. *B. geophana*, Nyl.; thallus, in our plant, so far, obsolete; apothecia minute, (0^{mm}., 2—0^{mm}., 3 wide) convex and immarginate, black, within yellowish-fuscous. Spores globular, 5-7 mic. in diameter, from 12 to 18 in the ventricose-clavate thekes, the paraphyses not distinct. — *Lecidea, Th. Fr. Scand. p. 441.* *L. geophana*, Nyl. *Scand. p. 212*, & *L. boreella*, Nyl. *Lapp. Or. p. 157*, *fide Th. Fr. l. c.*

On the earth, New Jersey (*Austin*) *Tuckerman Gen. 1872.* New Bedford, Mass., *Willey.* Illinois, *Wolf.* Also on rotten wood, Illinois, *Wolf.*

79. *B. moriformis*, (Ach.); thallus thin, scurfy, becoming compacted and chinky, greenish-gray, or whitish, or obsolete; apothecia minute (0^{mm}., 2—0^{mm}., 4 wide) adnate, from flattish soon and commonly depressed-convex, livid-pale passing into pale to dark-brownish, and black, above, and more or less persistently black-edged below, now polished and now opaque, the hypothecium colourless. Spores globular, very minute and numerous in the ventricose thekes, 1½-3 mic. in diameter, the paraphyses conglutinate, brownish-yellow above, finally distinct. — *Arthonia*, Ach., *fide Th. Fr. Strangospora pinicola*, Koerb. *Parerg. p. 172*, *fide Ohlert.* *Lecidea improvisa*, Nyl. *Scand. p. 213*, & *in Norrl. Lich. Fenn. n. 189.* *Biatorella moriformis*, & *B. pinicola*, Th. Fr. *Scand. p. 401.* *Biatora Ilicis*, *Willey olim.*

On bark of Holly and Elm, New Bedford, Mass. (*Willey*) *Tuckerman Gen. 1872.* On other bark at Lake Manitoba,

Macoun; and in Washington Territory, *Suksdorf* in herb. Sprague.—Dr. Th. Fries's exhaustive characterization, cited above, of this plant, enabled Mr. Willey to determine satisfactorily our own, long since discovered by him.—The lichen varies no little, and Irish specimens in herb. Taylor present a well-developed, dark-greenish thallus, and larger, black apothecia, reminding us of *B. denigrata*, Fr.; and, with these, the cited plant of Koerber (Hepp n. 253) with its white crust and light-brown apothecia contrasts strongly. It might also seem that the Manitoba specimens, which offer a pale, only black-edged disk, contrasted similarly with the wholly black-fruited ones from the other stations; but the latter, when wet, will be found to agree, more or less, with the others.—The spores of our lichen scarcely reach the dimensions of those of the European, in which all the parts appear indeed to be now larger.

80. *B. cyphalea*, Tuckerm. ; thallus thin, granulose, more or less at length compacted and rugose-verruculose, cinerascent, and whitish; apothecia small ($0^{\text{mm.}}$, $5-0^{\text{mm.}}$, 8 wide) sessile, from pale becoming dark-reddish, and rusty-brown, opake, the obtuse, at first paler margin disappearing, the hypothecium yellowish-brownish. Spores short-ellipsoid, 3-4 by 2-3 mic., very numerous in clavate-ventricose thekes, the distinct paraphyses at length lax, colourless above.—*Gen. p. 168.*

On Elm-bark, Illinois, *Hall.*

81. *B. fossarum*, (Duf.) Mont. ; thallus thin, scurfy, but compacted at length into an uneven crust, dirty-greenish, and cinerascent; apothecia small ($0^{\text{mm.}}$, $7-1^{\text{mm.}}$ wide) sessile and adnate, convex becoming hemispherical, immarginate, from pale-yellowish soon reddish-brown, the hypothecium yellowish-brown. Spores oblong, 7-11 by 3 mic., very numerous in intestiniform thekes, among capillary, soon lax paraphyses.—*Mont. Syll. p. 339. Lecidea, Nyl. Prodr. p. 116.*

Sterile clays, Illinois (*Hall*) Tuckerman *Gen. 1872.* Moist earth, New Jersey, *Austin.* Washington Territory, *Suksdorf.*

82. *B. campestris*, Fr. ; thallus scurfy-granulose, pale-

greenish; apothecia minute (0^{mm.}, 2—0^{mm.}, 5 wide) sessile a little elevated, commonly cup-shaped, but finally flat, from pale-amber at length rufous-fleshcoloured, the disk a little darker, slightly white-pruinose, the hypothecium pale. Spores from ellipsoid becoming oblong, 5-9 by 2-3 mic., very numerous in elongated thekes, among capillary, soon lax paraphyses.—*Fr. L. E.* p. 265, *fide Th. Fr. Scand.* p. 398. *Biatorella*, *Th. Fr. Sarcosagium biatorellum*, *Mass. Koerb. Parerg.* p. 438.

Upon the earth; as also on dead wood. Illinois (*Hall, &c.*) Tuckerman *Gen.* 1872. New Bedford, *Mass.*, *Willey*. New Jersey, *Austin*. Anticosti, *Macoun*. Maryland, *Lehnert*.

83. *B. resinæ*, (Fr.) ; thallus represented by a thin, at length and commonly brown, and byssoid, layer, or none; apothecia from small reaching middling size (0^{mm.}, 4—1^{mm.} wide) sessile or a little elevated, flat, with an obtuse margin which disappears as the disk becomes convex, from pale soon yellowish, becoming tawny, and at length black, the hypothecium pale-yellowish. Spores globular, 2-3 mic. in diameter, very numerous in ventricose-clavate thekes, among filiform paraphyses.—*Lecidea*, *Fr.*, *olim*; *Nyl. Prodr. Gall.* p. 117; *Scand.* p. 213. *Minks Symb. Lich. Myc.* p. 73. *Tromera*, *Mass. Koerb. Parerg.* p. 453.

On the resin of White Pine, *Mass.* (*Willey*) Tuckerman *Gen.* 1872. On the same, but also, and more commonly, on Pitch Pine resin, Vermont, *Frost*. On Spruce-resin, New York, *Peck*. On that of Larch, New Jersey, *Austin*.—Whether to be placed here, where certainly students might expect to find it, or reckoned a fungus (*Peziza*) as Fries first understood it, has always been doubtful; but it looks, as he says (*Syst. Myc.*, 2, p. 149) exceedingly like a lichen, and behaves like one, with iodine. Koerber (*l. c.*) indicates that the blackening of the apothecium is due probably to chemical change in the matrix; and this may presumably then also condition the development of a thallus; and turn, as Minks has suggested, (*l. c. p. 78*) what should have been a hypophlaeous, into a similarly imperfect, superficial one.

XLIX.—HETEROTHECIUM, Flot., emend.

Apothecia patellæform; variously coloured; the margin, for the most part, incrassated; and now lecanoroid. Spores ellipsoid; and oblong; either simple (§1) or bilocular (§2) or plurilocular (§3) or muriform-multi-locular (§4) or very minute and numerous in the thekes (§5) brown, or (mostly) decolorate. Spermatia, so far as known, ellipsoid, or oblong, on sub-simple sterigmas. Thallus crustaceous, uniform.—Remarkable, generally, for the large size of the apothecia, and of the spores. Whatever may be said of the difficulties of the group, members of which have been referred to *Lecanora*, to *Biatora*, and to *Lecidea*, its naturalness cannot well be disputed; and has, in one way or other, found significant recognition with lichenologists. The genus “is analogous, in *Biatorei*, to *Physcia* in *Parmelie*, to *Rinodina* in *Lecanorei*, and to *Buellia* in *Lecideei*; though better comparable as a tropical group, and tending similarly to more varied modifications, and even anomalies of spore-structure, to the equally tropical *Thelotrema*, and *Graphis*.” *Gen.*, p. 170, where the question is further considered.

* *Megalospora*. Spores simple.

1. *H. sanguinarium*, (L.) Flot.; thallus tartareous, of flattened granules soon confluent into a rimose, verrucose, finally gyrose-rugose, somewhat polished crust, glaucescent, or cinerascent; apothecia middling-sized to ample (1—3mm. wide) adnate, very black and more or less shining, commonly convex and immarginate, but also shewing early a demiss, pale to livid, now reddening, and now blackening excipular margin, at length confluent into gibbous or flattened, variously difform masses, the hypothecium pale, received in a blood-red layer, which now extends beyond the fruit, and is now without colour (f. *affine*.) Spores solitary, ellipsoid, broadly limbate, the grumous protoplasm more or less darkening, 54-92 by 24-48 mic.—*Tuckerm. Gen.* p. 171. *Lecidea*, *Schær. Spicil.* p. 150. *Fr. L. E.* p. 335. *Th. Fr. Scand.* p. 479.

On trunks, dead wood, rocks, and mosses. New York, *Halsey*, 1823. New England, *Tuckerman*. Canada, *A. T. Drummond*. Islands of Behring's Straits, *Wright*. Oregon, *L. H. Henderson*. California, *Bolander*.—Disk now almost discharged of colour (Anticosti, *Macoun*) when the aspect of the apothecium may be quite lecanorine.—The lichen is now bisporous in Europe.—Its relation to the present genus is considered in the author's *Genera*, pp. 172-3.

* * *Psorothecium*. Spores bilocular.

2. *H. grossum*, (Pers.) ; thallus thin, subcartilaginous, rimose-areolate and rugose, glaucescent, or cinerascent, or disappearing ; apothecia of middling size (1^{mm.}—1^{mm.}, 8 wide) elevated-sessile, very black, disk at first flat with a thick now flexuous margin, but becoming tumid and excluding the margin, black-pruinose, pale within, the hypothecium black. Spores in eights, ellipsoid, 18-28 by 8-16 mic.—*Lecidea*, *Nyl. Scand.* p. 239. *Catillaria*, *Th. Fr. Scand.* p. 581. *Lecidea premnea*, *Fr. L. E.* p. 329, not of Ach.

On Red Cedar, island of Grand Manan, New Brunswick, *Willey*. It has since occurred only on Ash, Magdalena Bay, Gaspé, Canada, and Anticosti, *Macoun*.

3. *H. versicolor*, (Fée) Flot. ; thallus thickish, rimose-areolate and rugose, or now thin and scurfy, or disappearing ; apothecia from middling at length large (1^{mm.}, 5—4^{mm.} wide) sessile, flat, the opake disk dark-brown, and black, the at first pale margin soon livid, and concolorous, pale within, the hypothecium brownish. Spores ellipsoid, in twos, fours, sixes, and eights, commonly curved, 40-70 by 20-30 mic.—*Lecanora* *dein Lecidea*, *Fée Ess.* p. 115, t. 28, f. 4; & *Suppl.*, p. 104. *Nylander* in *Prodr. N. Gran.*, p. 65, & in *Lindig Herb. N. G.* n. 746, 747, 2625. *L. vigilans*, *Tayl.*, *Nyl. Tuckerm.* in *Wright Lich. Cub.* n. 225.

Trees, Mexico, *Müller*, fide *Willey*.—Easily comparable, as are other allied foreign species, with the last ; as compare also and especially *Nylander's* description of his *Lecidea melanocarpa* (*Lich. exot.*, l. c., p. 260) of the next section.

4. *H. endochroma*, (Fée) Flot. ; thallus thickish, rugose-granulate, glaucescent or cinerascent with often a yellowish tinge ; apothecia middling to ample (1mm., 5—2mm. wide) flat, with a thick, smooth, bright-yellow margin, becoming livid as the black disk becomes turgid, and finally disappearing, the hypothecium fuscous, received in a bright-yellow layer. Spores in eights, ellipsoid, 16-20 by 5-6 mic. — *Lecanora*, Fée *Essai*, p. 114, t. 29, f. 1; & *Suppl.* p. 111, t. 42, f. 31. *Lecidea*, Nyl. *Tuckerm.* in *Wright Lich. Cub.* n. 226.

Trees. Mexico, Nylander, *N. Gran.*, 1864.

5. *H. leptocheilum*, Tuckerm. ; thallus thin, of small granules, passing into a rimose finally verrucose crust, whitish, and brownish, bordered by the fibrillose fringe of the blackening hypothallus ; apothecia middling-sized (1mm.—1mm., 5 wide) sessile, black, at first flat, with a thin, shining margin, which is soon excluded by the tumid, gibbous, opake disk, the hypothecium pale-brownish. Spores in eights, cymbiform, and fabæform, 12-16 by 4-5 mic. — *Obs. Lich.*, 4, l. c., 6, p. 280; & in *Wright Lich. Cub.* n. 227.

Trees, Orizaba, Mexico, Nylander, *Enum. Husn.*, 1869. Mobile, Ala., Mohr in herb. Willey.

*** *Bombyliospora*. Spores plurilocular.

6. *H. tuberculatum*, (Fée) Flot. ; thallus sub-tartareous, areolate-rimose, rugose, and at length coarsely verrucose, the warts, from white, now sulphur-coloured within (*f. chloritis*) yellowish, or now brownish, the hypothallus (in the tropical plant at least) blackening ; apothecia middling-sized to large 1mm., 5—3mm. wide) closely sessile, tumid, flat soon a little convex, the naked disk reddish-brown becoming dark-sanguineous, and blackish, the paler, obtuse margin finally also blackening, the hypothecium reddish-fuscous. Spores solitary, oblong-ellipsoid, 8-12-locular, 80-110 by 20-30 mic. — *Lecidea*, Fée *Ess.*, p. 107, t. 27, f. 1. *Tuckerm.* in *Wright Lich. Cub.* n. 228. Nyl. in *Prodr. N. Gran.*, p. 66; & in *Lindig Herb. N. Gran.* 723, 755, &c. *Heterothecium tuberculatum*, b, *Tuckerm. Gen.*, p. 174.

Trees, Alabama (*Beaumont*) Tuckerm. *Gen.*, 1872; (f. *chloritis*.) Florida, *Austin* (the same form.)—The European var. *pachycarpa*, Flot. (*Biatora pachycarpa*, Fr. *L. E.* p. 259) though in other respects like, and offering also the f. *chloritis*, which I observe at least in *Zw. n.* 80 (*Arnold*) differs in the thallus passing readily into deliquescent and mealiness: this state is unknown here.—The spores of the present stock now offer distinct indications of the coloration of the brown type.

6. (b) *H. pachycheilum*, Tuckerm.; thallus not unlike that of *H. tuberculatum*, but deliquescent and mealy as in the European var. *pachycarpum*, and always glaucous; apothecia middling-sized to ample (1—2 mm. wide) closely sessile, flattish, reddish-brown, with a turgid, pale margin, the hypothecium as in the last. Spores in twos, threes, and fours, ellipsoid, more or less curved, 40-80 by 15-24 mic.—*Lecidea, Obs. Lich. 3, l. c. 6, p. 281; & in Wright Lich. Cub. n. 230. Heteroth. tuberculatum, v. pachycheilum, Gen. p. 175.*

Trees. Low country of South Carolina (*Ravenel*) Tuckerman *l. c.* 1864. Georgia, *Ravenel*. Alabama and Mississippi, *Beaumont*. Louisiana, *Hale*. Texas, *Hall*.

6. (c) *H. porphyrites*, Tuckerm.; thallus sub-cartilaginous, smooth, rimose becoming rugose, and soon deliquescent and mealy, glaucous; apothecia middling-sized to large (1 mm., 5—4 mm., 5 wide) sessile, from flat soon convex, and from reddish-brown soon blackening, white pruinose, the stout, shining margin soon concolorous, at length excluded, the hypothecium pale. Spores solitary, 3-6-locular, 40-70 by 18-24 mic.—*Biatora, Syn. N. E. p. 61; & Lich. exs. n. 96. Heteroth. tuberculatum, v. porphyrites, Gen. p. 175.*

Trees. White Mountains, New Hampshire, *Tuckerman*, *l. c.*, 1848. Vermont, *Frost*. Massachusetts, *Willey*.—Interesting, like *H. tuberculatum*, v. *pachycarpum*, in the present stock, and genus, for its northern range.—*H. Wrightii* (*Obs. l. c.*, p. 275; and *Wright Lich. Cub.*, n. 235) resembles this in general aspect, but has not occurred within our limits.

* * * * *Lopadium. Spores muriform-multilocular.*

7. *H. Domingense*, (Pers.) Flot.; thallus of flattened granules, running into a thin, smooth but soon uneven, and finally thickened and rugose-verrucose crust, from glaucescent tinged more or less yellowish becoming bright-yellow, and then more orange; apothecia middling-sized (0^{mm.}, 7—1^{mm.}, 5 wide) sessile, the disk flat finally a little convex, sanguineous and blackening, yellow-powdery at length naked and smooth, with a tumid, smooth and shining, very entire, now flexuous, orange-yellow margin, finally gyrose-proliferous, the hypothecium more or less reddish-fuscous. Spores in twos, threes, fours, sixes, and eights, ellipsoid soon elongated, 6-10-locular, the lenticular cells entire, or at length divided into two equal ones, various in size, 20-40 by 6-18 mic., colourless.—*Lecanora, Ach. Syn.* p. 336. *Parmelia ventosa, Domingensis, Eschw. Bras.* p. 189. *Lecidea, Nyl. Tuckerm. in Wright Lich. Cub.* n. 231. *Parmelia gyrosa, Mont. Cuba, p. 212.*

Trees. Low country of South Carolina (*Ravenel*) Tuckerman *Gen. 1872*. Florida, *Austin*. Louisiana, *Hale*. Texas, *Hall*.—The very close relation in which this species stands to *H. vulpinum* suggests readily that it is rather to be taken for an inchoate *Lopadium* than a small-fruited *Bombyliospora* with *Lopadium* affinities. And the specimens cited from South Carolina and Texas, in which the spores, occurring in less than the normal number in the thekes, assume something of the dilatation and other change of outline of those of *H. vulpinum*, and shew commonly at length all the spore-cells divided at the middle, while still referable only to *H. Domingense*, lend weight to the suggestion.

7. (b) *H. vulpinum*, Tuckerm.; thallus of *H. Domingense*; apothecia not differing, though the fruit becomes finally sanguineous-rufous with concolorous margin. Spores solitary, or in twos, threes, and fours, from cocciform becoming oblong ellipsoid, muriform-multilocular, in six to ten series of two to four members each, 25-50 by 14-20 mic., colourless.—*Lecidea, Obs. Lich., 3, l. c. 6, p. 281; & in Wright Lich. Cub. n. 233. Nyl. Syn. N. Caled., p. 50. Heterothecium, Tuckerm. Gen. p. 175.*

Trees. Florida, *Ravenel*; *Austin*.—A distinct *Lopadium*; but the young spore not differing from that of *H. Domingense*.

8. *H. leucoxanthum*, (Spreng.) Mass.; thallus cartilagineous, smooth, soon chinky, granulate, and rugose-verrucose, glaucescent, and white; apothecia middling-sized to ample (1—2mm. wide) sessile, flat, disk yellow or green-powdery becoming fulvous, rust-coloured, and now dark-green, at length a little convex, the tumid margin orange-yellow, saffron, rusty or finally reddish-brown, now flexuous, and the fruit finally proliferous, the hypothecium reddish-fuscescent. Spores solitary, muriform-multilocular, in about twenty series of six to ten members each, 42-92 by 20-40 mic., fuscescent. —*Tuckerm. Gen. p. 176. H. tricolor, Mont. Syll. p. 341.*

Trees. Swamps, in the upper country of North Carolina, *Curtis*. At Aiken, and in the low country of South Carolina, *Ravenel*. Florida, *Austin*. Alabama and Mississippi, *Peters*, &c. Louisiana, *Hale*. Texas, *Ravenel*.—Represented in the alpine districts of Scotland, and in the north of Norway, by the strongly-marked *H. fuscoluteum* (Dicks.) only recently removed (by the spores) from its long confusion with *Placodium*; but not yet known here.

9. *H. pezizoideum*, (Ach.) Flot.; thallus of scattered, now and with us commonly flattened, squamaceous and sublobulate, or now verrucose and even coraloid, granules, greenish soon fuscescent, and blackening; apothecia small to middling (0mm., 5—1mm., 5 wide) elevated and more or less turbinate, disk black, opaque, from concave with a stout, entire but rugulose, brown margin, or at length flat, and the margin concolorous, the hypothecium fuscescent. Spores solitary, muriform-multilocular, the transverse series of cells from fourteen to twenty-four, 44-100 by 18-40 mic., fuscescent.—*Lopodium, Koerb. Syst. p. 210. Th. Fr. Scand. p. 389. L. pezizoides & L. muscicolum, Koerb. Parerg. p. 175. Calicium dein Trachylia phaeomelana, Tuckerm. Syn. N. E. p. 79; Lich. exs. n. 98.*

Fir-bark, White Mountains, *Tuckerman l. c.*, 1848. On White Cedar, New Bedford, Mass., *Willey*. Bark, Washington Territory, *Suksdorf*. On mosses, islands of Behring's

Straits, *Wright*. Greenland, *Stizenberger Index Lich. Hyperb.*
Anticosti, *Macoun*.

10. *H. phyllocharis*, (Mont.?) ; thallus very thin, membranaceous, smooth or granulate, greenish-glaucous; apothecia minute (0^{mm}, 25—0^{mm}, 5 wide) sessile, convex, pale-brownish, or greenish, or at length black, with a thin, disappearing, white margin, the hypothecium brownish. Spores solitary, muriform-multilocular, the series of cells twelve to thirty, of three to six members each, 30-75 by 12-36 mic., fuscescent or decolorate, the paraphyses deficient.—*Biatora*, Mont. in Ann. 3, 10, p. 128? e descr. *Sporopodium Leprieurii*, Mont. Guy. p. 26, t. 16, f. 1? e descr.

Evergreen leaves, Florida, *Austin*.—It is only with hesitation that I venture to refer this Florida lichen (a native also of Cuba, *Wright*) to Montagne's description of his cited *Biatora*, afterwards associated by him with, and seemingly too near to his later *Sporopodium*; and am determined, in so doing, mainly by the deficiency of the paraphyses, a more important note perhaps than the more or less stalked thekes.

11. *H. Augustini*, Tuckerm. in litt. ad int.; thallus thin; granulate, glaucheous; apothecia minute (0^{mm}, 3—0^{mm}, 5 wide) sessile, plano-convex, disk livid-blackish, the thin, demiss margin white, the hypothecium brownish-rufescent. Spores solitary, muriform-multilocular, decolorate, 40-60 by 14-20 mic., the paraphyses few, loose, divergently branched.

Trees. St. Augustine, Florida, *Sprague*.—Much like the preceding; and admitted with the same hesitation.

***** *Biatorella*. Spores exceedingly minute, and numerous in the thekes.

12. *H. conspersum*, (Fée) Flot.; thallus of very minute, separate, then crowded granules, from yellowish-glaucous passing into orange-yellow; apothecia small (0^{mm}, 5—1^{mm}, wide) sessile, at first flat, the disk orange-powdery or granulate, at length blackish, but soon and commonly convex, and quite excluding the at first tumid, pale yellow, or when rubbed seen to be blackish margin, the hypothecium reddish

and blackish-brown. Spores globular, in linear-clavate thekes.—*Lecidea*, *Fée Ess.* p. 108; *Suppl.* p. 109, t. 42, f. 26. *Tuckerm.* in *Wright Lich. Cub.* n. 224.

Trees, southern Alabama, *Beaumont*.

12. (b) *H. nannarium*, Tuckerm. ; thallus scurfy-granulose, pale-lemon-coloured ; apothecia very minute (0^{mm}, 1—0^{mm}, 25 wide) sessile, flattish, disk naked, reddish-brown, the thin margin yellow, the hypothecium fuscous. Spores globular, in short-saccate thekes.—*Gen. p.* 176.

Trees. Texas (*Wright*) Tuckerman *l. c.* 1872.

Sub-Fam. 3.—EULECIDEI.

Apothecia sessile ; exciple coal-black.

L.—LECIDEA (Ach.) Fr., Tuckerm.

Apothecia normally patellæform, and horny. Spores colourless, shewing the whole development of the colourless type, from ellipsoid soon fusiform, passing at length into acicular and 2-4-plurilocular, the cells always entire (§ *) or ellipsoid and simple, except in n. 31, in which they are tailed below and 4-8-locular ; and n. 42, in which they are variously curved and 4-locular (§ **) or very minute, and numerous in the thekes (§ ***). Spermatia for the most part oblong or staff-shaped, or very rarely filiform and bowed, on sub-simple sterigmas. Thallus now rarely caulescent (in § *) or more or less lobulate (as in the same section, and in § ****) but, for the most part, uniform.—The group is disposed here as by Fries, *L. E.* ; and the reason of it as set forth by him, p. 281-4, &c., has been fully recognized, in one way or other, in the works of subsequent lichenographers. Beyond the separation of the species with brown spores, more recent lichenologists have varied but little from the spirit of Fries's arrangement. There is at least no dispute as to the central series of rock-*Lecidea*. But

with this another is associable, of various habitat (§ * * b) the relation of which to *Biatora* is more close: one or two of the lichens once referred here, are now, in view at once of their microscopical structure, and their other affinities, more satisfactorily removed to that genus; and states of others (themselves sufficiently Lecideine) look, now curiously enough, the same way.

* *Toninia*. *Thallus glebous-squamulose, heaped at length and rugose-plicate, more or less lobulate; rarely caulescent (n. 4, 8) now much reduced and granulose (n. 7) or deficient (n. 10.) Spores from simple bi-plurilocular, and from ellipsoid through fusiform acicular.*—The analogue here of the section *Psora* in *Biatora*.

1. *L. candida*, (Web.) Ach. ; thallus of turgid, glebous squamules crowded and growing together into a wavy, rugose-plicate crust, and more or less lobulate, especially at the circumference, white, the surface granulate, becoming mealy; apothecia middling-sized to ample, appressed, flattish, white-pruinose, the obtuse margin finally lobate-flexuous; within pale, the hypothecium fuscous. Spores (in French specimens) fusiform and sub-acicular, bilocular, 16-22 by 3-4 mic. —*Schær. Spicil. p. 120. Fr. L. E. p. 285. Th. Fr. Scand. p. 338.*

Upon the earth in the extreme north. Arctic America, (Richardson) Hooker *l. c.*, 1823. Greenland (Vahl) Th. Fr., *l. c.*

2. *L. cæruleo-nigricans*, (Lightf.) Schær. ; thallus of glebous squamules, stipitiform-extended downwards in the more perfect states, and there fulvescent and radiculose, expanding and sub-lobate above, and finally crowded and gyrose-plicate, pale-olivaceous-brown or at length dark-greenish, for the most part densely white-pruinose; apothecia middling-sized to ample, peltate, flattish, obtusely marginate, pale within, the hypothecium at length brown. Spores fusiform and sub-acicular, bilocular, 14-27 by 2-4 mic.—*Schær. Spicil. p. 120. Toninia, Th. Fr. Scand. p. 336. Lecidea vesicularis (b. excl.) Fr. L. E. p. 286.*

On the earth in mountainous, and high northern regions. Mountains of Utah (*Watson*; *Lapham*) Tuckerman *Gen.*, 1872. Rocky Mountains in Colorado, *Pringle* in herb. Sprague. Shores of Gulf of St Lawrence, lat. 48° , *Pringle*, in the same herbarium.

3. *L. Brandegei*, Tuckerm. ; thallus rugose-plicate, greenish-ochroleucus ; apothecia ample (1mm., 5 to 3mm. in width) beneath mostly free, flat, soon wavy, the disk very black and opake, the originally pale margin soon blackening, bright, and lobate-crenate, then demiss, and disappearing ; pale within. Spores short-ellipsoid, simple, 6-11 by 4-6 mic. Paraphyses at length distinct, and bluish then brownish-capitulate.—*Bull. Torr. Bot. Club*, 1883, p. 21.

Rocks, Rocky Mountains, Colorado, *T. S. Brandegee* in herb. Sprague. Notwithstanding the originally lecanorine character of the apothecia, the natural affinity of the lichen is with the next following, which it is as near to as it strikingly differs from.—Spermatia, so far as seen, short-aciclar, now bowed, about 16 mic. in length, and less than one in width.

4. *L. Pringlei*, Tuckerm. ; thallus pulvinate, (about half an inch in height) composed of crowded, branched trunks, which are dilated above and densely plicate-rugose, and pass at the base into rootlike branchlets, pale to dark-green, and finally black, and shining ; apothecia ample to very large (2-6mm. in width) a little elevated at the centre, flat, soon wavy and lobed, and at length variously irregular, the disk from rufous-fuscescent soon very black, excluding the at first pale but soon black, and shining, stout margin, within pale. Spores from broad-ellipsoid oblong, simple and pseudo-bilocular, 10-12 by 3-5 mic., the paraphyses scarcely distinct. Spermatia filiform, now bowed, 18-24 mic. long.—*Bull. Torr. Bot. Club*, 1883, p. 21.

Rocks. Sierra Nevada, California, *C. G. Pringle* in herb. Sprague. On the eastern slope of the Cascade Mountains, Washington Territory, *Brandegee*, in the same herbarium. The specimens last-named are strikingly differenced from those of the Sierra Nevada by the extension of the trunks

into slender, naked, irregularly-branched stems, expanding only at the summits into the plicate state, with something of the look and at length colour of branches of *Alectoria ochroleuca* f. *nigricans*. The hypothecium of *L. Pringlei*, as that of *L. Brandegei*, rests on gonidia, and the feature is more pronounced and constant than it seems to be in the European *L. conglomerata*. But I take the latter (in which also the apothecium is originally lecanorine) to be the key to the position of both the better-developed North American lichens.

5. *L. massata*, Tuckerm.; thallus of small, scattered, turgid, glebous squamules becoming at length plicate, pale-greenish and glauescent; apothecia small to middling-sized (0^{mm.}, 5—1^{mm.}, 5 in width) peltate, flat, but, the thin uneven margin at length disappearing, finally convex and irregular, pale within, the hypothecium rufous-brown. Spores cymbiform, bilocular, 9-16 by 3-5 mic.—*Lich. Calif.* p. 25.

On the earth in gravelly soil, San Francisco, California (*Bolander*) Tuckerman *l. c.* 1866. Colorado, Brandegee in herb. Sprague.—Spermogones not observed.

6. *L. cumulata*, Sommerf.; thallus of small, adnate, thickish, flattish, areolar squamules, crowded soon and confluent in a rimose-rugulose, and effigurate, cinerascent, and whitish crust; apothecia minute, flat, black, (and now also rufous with paler, crenulate margin) densely conglomerate, for the most part, in roundish heaps, the hypothecium at length brownish. Spores fusiform ellipsoid, commonly 2-locular, but found also 3-4-locular, 12-18 by 4-6 mic.—*Sommerf. Suppl.* p. 157. *Toninia, Th. Fr. Scand.* p. 341. *Lecidea paracarpa*, Nyl. *Scand.* p. 219. *L. perfidiosa*, Nyl. *l. c.* p. 244, teste *Th. Fr.*

On the earth in alpine and arctic regions. Greenland (*Vahl*) *Th. Fr. l. c.*, 1861.—Spermogones not observed.

7. *L. granosa*, Tuckerm.; thallus of minute granules, either scattered becoming now scurfy, or disappearing, or crowded into a broken crust, from greenish and glauescent at length ashcoloured, and brownish; apothecia minute (0^{mm.}, 3—5 in width) appressed, flattish, the disk black (now livid-

pallescent) excluding finally the thin, black margin, the hypothecium dark-rufous-brown. Spores from cymbiform soon dactyloid and sub-acicular, 2-4-locular, 9-20 by $2\frac{1}{2}$ - $4\frac{1}{2}$ mic. Spermatia filiform, bowed, on sub-simple sterigmas, as in the other species of the present section, so far as is known.

—*Obs. Lich. 2, l. c. 5, p. 420.*

On bricks and mortar, New Orleans, Louisiana (*Hale*) Tuckerman *l. c.* 1862. On the same substrates in South Carolina, and Georgia, *Ravenel* (as also on tiles in the island of Cuba, *Wright.*) On lime-rocks, New Jersey, *Austin*; New York, *Willey*; Ohio, Miss Biddlecombe. —A representative here of the far more distinguished *L. aromatica* (Sm.) Mass., of Europe.

8. *L. squalida*, (Schleich.) Ach.; thallus of thick, appressed, or ascendant and imbricated, lobed squamules, which are crowded together at length into rugose heaps, tawny-fuscous, becoming livid, and now blackening; apothecia middling-sized, adnate, flat, but soon excluding the thin margin and finally convex, sub-globose, and variously irregular, and, for the most part, conglomerate and confluent into large masses, pale within, the hypothecium rufescent. Spores from oblong becoming dactyloid, and acicular, and from 4-plurilocular, 28-48 by $2\frac{1}{2}$ -5 mic. —*Ach. Syn. p. 19.* *Schaer. Spicil. p. 120.* *Toninia squarrosa*, *Th. Fr. Scand. p. 331.*

b. *caulescens*, Nyl.; the squamules extending downwards into strong, brownish stems. —*Stizenb. Lich. Helv. p. 176.* *Toninia caulescens*, *Anz. Catal. p. 67; Lich. Langob. n. 139.*

On the earth in alpine and arctic regions. Greenland (*Vahl*) *Th. Fr. l. c.* 1861. —b, Mountains of California, *Bolander.* Cascade Mountains, Washington Territory, *Brandegee* in hb. *Sprague.*

9. *L. ruginosa*, Tuckerm.; thallus of rounded, turgid, glebous squamules which become more or less crowded together, wavy, and rugose-plicate, and are finally cancellated, from greenish at length tawny-brown; apothecia ample to large (1^{mm}, 5 to 3^{mm}. in width) flat, at length flexuous-lobate,

scarcely excluding the stout margin, pale within, the hypothecium brownish. Spores acicular, 4-plurilocular, 25-40 by 2-3 mic. Spermatia filiform, bowed, on sub-simple sterigmas.

—*Lich. Calif.* p. 25.

Serpentine rocks on the coast of California (*Bolander*) Tuckerman *l. c.*, 1866. Squamules less developed than in the last preceding, scarcely lobed. Apothecia originally rufous.

10. *L. flavovirescens*, (Dicks.) Borr. ; thallus foreign, but deliquescing soon and the colour changing to greenish-yellow ; apothecia small to minute, sessile a little elevated, from sub-globose and concave finally flat with an obtuse margin, the hypothecium brownish-black. Spores acicular, plurilocular, 40-70 by 3-4 mic.—*Borr. in Hook. Br. Fl.* 2, p. 178, *not of Fr. L. E.* p. 291. *Rhaphiospora*, *Mudd Man.* p. 186. *Secoliga*, *Stiz. Krit. Bemerk.*, p. 11. *L. citrinella*, *Fr. L. E.* p. 346. *Nyl. Scand.* p. 248.

Parasitic on the thallus of *Bæomyces byssoides*, in the White Mountains, *Tuckerman* *Syn. N. E.* 1848.—The relation of the described apothecia to the thallus upon which they grow is to me the same as in the analogous and admitted case of *Buellia scabrosa*. Exactly as in the latter, the apothecia of the former (in all my specimens from the White Mountains, as in the admirable *Fr. Lich. Suec.* n. 214) occupy, and appear to occasion similar changes in the thallus of the cited *Bæomyces*. Both fruits are in every respect lecideine, notwithstanding the failure of the test with iodine.

** *Eulecidea*. *Thallus uniform. Spores simple, except in n. 31, and n. 42.*

a. *Areolatæ. Rock-lichens.*—The centre and type of the genus, and its most difficult portion ; a difficulty which no amount of authentic material—such is the general agreement here in habit and structure, and the great variableness of form—can more than alleviate (*) ; and modern attempts

(*) This is sufficiently shewn by Dr. Th. Fries's recent criticisms (*Lich. Scand. passim*) of the determinations of *Lecidea* by the most eminent lichenographer of our day. To mention a single example of these animadversions, for which Dr. Fries should appear to have been amply equipped, we are told by him (*l. c.*, p. 490) under *L. tessellata*, *Fl.* (the *L. spilota*, *Fr.*, but called, at the place cited, *L. cyanea*) that the only specimen among those so referred by Nylander, in the

to hide which by an unexampled and seemingly reckless proposition of "new species," serve only to make irremediable. Fries, (L. E., 1831) was the first to give lichenists a thoroughly scientific review of the group; and his results, with certain exceptions determined by spore-differences, (though in general the spores are here of only inferior account) have every claim, in view of the excessive particularism of later research, to be regarded, until larger studies, in the direction of the much needed new *Lichenographia reformata*, shall bring further light.

† *Spores simple.*

‡ *Glaucescentes.*

11. *L. pruinosa*, (Sm., teste Borr.!) Flot.; thallus tartareous, originally continuous, then areolate-rimose, now much reduced, and disappearing, a black hypothallus more or less to be made out; apothecia small to ample, commonly adnate, or now elevated, always flattish, the disk softish, rufescent at least when wet (and black) scarcely excluding the thin margin, at length dilated, flexuous-lobate, and breaking up into smaller ones, the hypothecium pale. Spores ellipsoid, "9-12 by 5-6 mic."—*Lecidella*, Koerb. *Syst. p. 235.* *Lecidea albocæruleascens*, Fr. L. E. p. 295, & *Lich. Suec. n. 374.* *L. lapicida*, v. *lithophila*, Nyl. *Scand. p. 226.* *L. lithophila*, Th. Fr. *Scand. p. 495.*

Rocks. Greenland (f. *ochracea*) Vahl, e Th. Fr. *Arct. 1861.* Lime-rocks, Texas (thallus thick, delicately rimulose, white, obscurely now black-limited; apothecia reaching 2mm. in width, elevated, with the habit and characters of the arctic lichen (Finmark, Th. Fr.!) as also of *Anz. Ital. n. 78*; and spores 9-13 by 5-8 mic., in width) *Wright.*—That *Lichen pruinosus*, E. Bot. pl. 2244, which is commonly taken to refer to *Lecanora privigna*, b, really relates to the *Lecidea pruinosa* above-described rests on authority which one

Finland museum herbarium, which really belongs to that species, is there determined as *L. lapicida*, Fr., while the others are distributed between this species, *L. variegata*, Fr., and even the remote *L. enteroleuca*. In part no doubt, as certainly with respect to another, more startling emendation, at the same place, these are mistakes of haste; but they illustrate, none the less, the difficulty of the study before us.

acquainted with the late Mr. Borrer can scarcely regard as other than conclusive. The specimen cited was named and given to me by the English lichenographer, and its value in the case is confirmed by the testimony of another most scrupulous observer Schärer, who (*Spicil.* p. 158) pronounces the specimen sent by Borrer to him identical with Fr. *Lich. Suec.* n. 374. According to *Herb. Ach.* (*teste* Th. Fries, *Scand.* p. 497) the present lichen makes indeed part (a very small one) of the motley assemblage of species representing Acharius's *L. lericia*, *v. lithophila* (*L. U.*) elevated by him afterwards to species-rank (*Syn.* 1814) and some writers have adopted therefore this designation for the plant; it is manifest however that the author of *L. lithophila* had no such understanding of the so-called species or its name; which appears then to be destitute of authority earlier than Nylander (*).

12. *L. cruciaria*, Tuckerm. *in litt.*; thallus very thin, scurfy, glaucous-white, intersected (as seen when wet) by tortuous black lines; apothecia small (0mm., 5-8 in width) sessile, flat, disk black, opake, finally a little convex, and the originally stout, wrinkled, at length flexuous margin disappearing, the pale hypothecium somewhat fuscous, as in the last preceding. Spores oblong-ellipsoid, 10-20 by 3-6 mic., the clavate paraphyses with brown tips at length rather lax.

On ("probably tertiary") sandstone, Sta. Cruz, California, Herb. Sprague. — A coarser lichen, with mostly deficient, but now sparse, when finally chinky, glaucescent thallus, in which the hypothallus is not shewn; and apothecia with more or less distinctly wrinkled margin, and imposed now on a border-like thalline layer (both features of *L. pruinosa*) but scarcely shewing any structural differences from the lichen of Sta. Cruz, has occurred on "volcanic tufa" at Union, Oregon

(*) Apart from this, which can hardly be called other than arbitrary construction, let it be permitted to me to question another form of arbitrariness. *Xanthoria*, Th. Fr., can derive no right from the use of the name as a section, incongruously constituted, of *Parmelia*, in Fr. *S. O. V.*, to supplant the definite genus *Theloschistes* of Norman. And when the authors of *Lichen pruinosa*, above-noticed, printed their description of it as a distinct species, in 1811, all the evidence there is shews that Acharius regarded it as a form of another species — *L. lericia*. If he afterwards arrived at a different view, is that a reason for ignoring the earlier, and, as it happens, the only pure designation, in favour of a modern and unauthorized use of his species-name of 1814?

(*Cusick* in *herb. Sprague*) and is placed here for further investigation. I venture to consider both plants nearest to the species last-named, if not to be subsumed under it.

13. *L. tessellina*, Tuckerm. ; thallus sub-tartareous, rimose-areolate, glaucescent (cinerascent, and now a little yellowish) the areoles flat or flattish but now at length turgid, margined more or less by the blackening hypothallus ; apothecia minute, (0^{mm.}, 3-7 in width) immersed in the areoles, from concave soon flat, naked, the thin, acute margin sub-persistent, finally confluent-diform, the hypothecium colourless. Spores ellipsoid, 9-14 by 5-7 mic.—*Obs. Lich. 4, l. c. 12, p. 181.*

On various rocks, common. New England, *Tuckerman*, *l. c.*, 1877. Canada, *Macoun*. New Jersey, *Austin*. North Carolina, *Curtis*. South Carolina, and Georgia, *Ravenel*. Alabama, *Peters*. Missouri, and Kansas, *Hall*.

14. *L. tessellata*, Floerk. ; thallus sub-tartareous, rimose-areolate, glaucescent, covering a black, more or less limiting hypothallus ; apothecia small to ample, and large, appressed, flat, the disk horny and black, and originally glaucous-pruinose, the thin, elevated, persistent margin at length crispate-flexuous, the hypothecium pale. Spores short-ellipsoid, 6-10 by 4-6 mic.—*L. spilota*, *Fr. L. E. p. 297* ; *Lich. Suec. n. 409*. *Lecidella*, *Koerb. Syst. p. 237*. *L. cyanea*, *Th. Fr. Scand., p. 489*.

Granitic rocks. Greenland (*Vahl*) *Th. Fr. l. c.*, 1861. At Lake Superior, *Agassiz*. New England, *Tuckerman*; *Frost*. Rocky Mountains, *Hayden*, &c. California, *Bolander*. Oregon, *Hall*.—These plants do not always agree chemically, any more than other closely associable lichens ; but are commonly well marked by the at length crisped apothecia.

15. *L. auriculata*, *Th. Fr.* ; thallus tartareous, rimose-areolate passing into verrucose, glaucescent, or now disappearing ; apothecia middling-sized to ample, appressed or adnate, flattish and marginate or at length convex excluding the margin and tuberculate, commonly at length sinuately lobed, and variously irregular, black and keeping the colour

when wet, the hypothecium brown. Spores oblong, 6-11 by $2\frac{1}{2}$ - $3\frac{1}{2}$ mic.—*Th. Fr. Scand.* p. 499.

Granitic rocks. Greenland (*Vahl*) *Th. Fr. l. c.*, 1861; and elsewhere in Arctic America, *Th. Fr.*, in *Linn. Journ.* A single specimen from the Notch of the White Mountains seems to suggest it.

16. *L. variegata*, Fr.; thallus sub-cartilaginous (and coarser) passing into more or less minute, depressed, glaucous, or very commonly yellowish-white, now orange-red areoles, which are scattered over, or, being crowded into groups, interruptedly cover a black hypothallus; apothecia small to ample, from innate becoming superficial, and from concave flat, finally dilated, and now convex and plicate, delicately somewhat pruinose, the at first coarctate, thin margin at length obtuse, persistent, the hypothecium pale becoming brownish. Spores ellipsoid, "9-12 by 5 mic."—*Fr. L. E. p. 303; Lich. Suec. n. 407. L. lactea, Scher. Lich. Helv. n. 176. L. pantherina, Th. Fr. Scand. p. 491.*

Rocks. North America, *Fr. S. O. V.*, 1824; & *L. E.*, 1831.—A well-marked lichen; not as yet known here.

17. *L. polycarpa*, Fr.; thallus rimose-areolate, the flat areoles glaucous-cinerascent, or now deficient, as is commonly the black hypothallus; apothecia small to middling-sized, appressed, crowded commonly into variously shaped groups and becoming by pressure angular, the disk always flat, very black, and naked, the thin margin persistent; within pale, the hypothecium at length brownish. Spores much as in the last.—*Fr. L. E. p. 305. L. pantherina, v. lericida, Th. Fr. Scand. p. 493. L. lactea, Nyl.*

Alpine and arctic rocks. White Mountains, *Tuckerman Gen.* 1872. Labrador, *Krempehuber*. Arctic America, *Stizenberger, Index*. Rocky Mountains, alt. 8000 feet, *Lapham*. The first and last of these lichens well agree with European ones, referred, and I think rightly, to the present species, as Fries understood it. And however manifestly near to the last it is distinguishable by the differently coloured

thallus and the intensely and always black apothecium; and is recognizable also by the common disposition of the fruit in conspicuous clusters.—*L. polycarpa* “*n'est en réalité que le L. lactea à hypothecium incolore.*” Nyl. in Lamy *Cat.*, p. 120.

18. *L. lapicida*, Fr. ; thallus tartareous, areolate-verrucose, from glaucous at length more or less ashcoloured, the black hypothecium mostly obsolete; apothecia middling-sized, appressed, black, commonly flattish, at length very flexuous, convex, confluent, and difform, and the thin margin disappearing, within more or less darkened and blackish or now greenish, the hypothecium brown. Spores short-ellipsoid, 8-10 by 3½-7 mic.—*Fr. L. E.* p. 306; *Lich. Suec.* n. 408. *Nyl. Scand.* p. 226, *a. L. silacea*, *Th. Fr. Scand.* p. 487, *pr. p.*

b, *oxydata*, Fr. ; thallus orange-red.—*L. silacea*, Ach.

Mountains of California, alt. 8000 feet (b) *Bolander*, exactly the well-marked lichen of *Fr. Suec.* n. 408; *Schær. Helv.* n. 191; and *Anz. Langob.* n. 159. A glaucous lichen occurs lower down in the same region (*Bolander*) which is scarcely separable. Elsewhere the plant has not occurred with us. Fries's view, followed at first by Koerber (*Syst.*) associated it, as possessing an “entire exciple,” with the next following group of species; and it may be said to anticipate that, while better placed with the present.

19. *L. panæola*, Ach. ; thallus tartareous, verrucose-areolate, the soon tumid, now at length wrinkled areoles scattered, or more or less crowded, from glaucous passing into ashcoloured, interspersed with garnet-reddish (finally darkening) tubercles, and covering a blackening hypothallus; [apothecia middling-sized to ample, adnate or immixt, flattish, or the more or less pruinose disk finally convex and the obtuse margin disappearing, the hypothecium brownish-black. Spores ovoid-ellipsoid, “18-34 by 10-16 mic.”]—*Fr. L. E.* p. 314; *Lich. Suec.* n. 380. *Nyl. Scand.* p. 223. *Th. Fr. Scand.* p. 502.

Granitic rocks. White Mountains, *Tuckerman* Syn. N. E. 1848. Greenland, *Vahl e Th. Fr. Arct.* This extraordinarily

characterized lichen is very rarely fertile in Europe (Schær. Nyl.) and fruit has not been found in the New England plant.

20. *L. contigua*, Fr.; thallus tartareous, originally contiguous, but becoming soon rimose-areolate and now verruculose, glaucescent and variously cinerascent, covering a blackening hypothallus; apothecia small to ample, from innate finally sessile, from flat at length tumid, and excluding the thin margin, commonly black and scarcely pruinose, within black, contrasting in section with the white disk, the hypothecium brownish-black. Spores ovoid-ellipsoid, 12-20 by 6-9 mic.—*Fr. L. E. p. 208, exc. excip., Lich. Suec. n. 377, 378.*

b. *hydropila*, Fr.; thallus areolate-verruculose, tinged, always in our plant, orange-red, by iron; apothecia small to middling, also more or less tinged, and rufous.—*Fr. l. c.; Lich. Suec. n. 379.*

Granitic rocks. New England, *Tuckerman* Syn. N. E., 1848. New York, *Peck*. The lichen is inferior in most respects to the one immediately following, but more various in its range of variation as in its habitat and colours, passing now into brownish, rugulose states, and occurring on brick in Pennsylvania, *B. M. Everhart*; and on dead wood in Massachusetts, *Willey*.—b, White Mountains, along water-courses, *Tuckerman*.—A not dissimilar plant, with greatly reduced, rusty thallus, much intersected with black lines by the hypothallus, and the spores of the species, has occurred on the shores of the Rio Grande, California, *Bolander*.—The all but universally accepted name of this species is at the same time the oldest certain one; and no uncritical, early designation of a scarcely typical member (*L. platycarpa*) of the specific group, however supported (accidentally, we must suppose) by a herbarium specimen, can well be permitted to supplant the critical determination of Fries.

20. (b) *L. speirea*, Nyl.; thallus tartareous, imperfectly more or less rimose, white, now mealy, with an at length blackening hypothallus; apothecia middling-sized to ample, from innate adnate and finally convex, mostly naked, elevated at length on a thalline layer, and the obtuse margin more or

less white-powdery, otherwise as the last. Spores ellipsoid, 10-15 by 6-9 mic.—*L. contigua*, v. *speirea*, *Fr. Lich. Suec.* n. 410, & n. 376. *Anz. Lich. Lang.* n. 160. *L. speirea*, *Th. Fr. Scand.* p. 485.

Granitic and calcareous rocks. White Mountains, *Tucker-man*. North shores of Lake Superior, *Agassiz*.—A marked lichen, but not easily to be far separated from the immediately preceding, as exhibited in Hepp *Flecht. Eur.*, n. 126 (*L. contigua* of this author, as of Koerber, and Stizenberger, but inseparable from *L. speirea*, Th. Fr.) and *Anz. Lich. Ital.* n. 285 (*L. contigua* of Anzi, and Stizenberger, but admitted, as respects at least one of the two specimens, to be his *L. speirea* by Dr. Fries.) It passes into the next, still more distinguished form.—*L. speirea*, Ach., could hardly have been, unless accidentally, and Dr. Fries shows (*Scand.* p. 486) from the Acharian herbarium, that it was not *nomen purum*.—The too artificial character of an arrangement founded on the reaction or want of reaction of the hyphæ with iodine, is sufficiently shewn by the composition of *L. speirea*, Th. Fr.; and by its wide separation from the lichens with which it naturally belongs.

20. (c) *L. confluens*, Schær.; thallus tartareous, rimose-areolate, bluish-gray (and pallescent) opake upon a black hypothallus; apothecia middling-sized to large, appressed, from flattish soon convex, crowded together into groups, dilated, and flexuous-multilocular, the disk very black and opake, the stout, obtuse margin becoming attenuate, and disappearing, the hypothecium blackish-brown. Spores ellipsoid, 10-15 by 6-9 mic.—*Schær. Spicil.* p. 144; *Lich. Helv.* n. 187. *Zw. exs.* n. 131.

Granitic rocks in alpine and arctic regions. Arctic America (*Richardson*) Hooker, *l. c.*, 1823. Greenland, *Vahl*, e Th. Fr. Arct.

20. (d) *L. albocærulescens*, (Wulf.) Schær.; thallus tartareous, continuous becoming more or less rimulose, smooth, pale-olivaceous-glaucous (“as if oil-besmeared,” Floerk.) upon a blackening hypothallus; apothecia commonly small to middling-sized, but at length even large, solitary for the most

part, from innate soon and commonly adnate, and flat, becoming finally dilated, flexuous, and even proliferous, the disk livid-brown soon blackening, covered conspicuously with a gray, at length ashy, even rusty-greenish bloom (rarely evanescent) the thick but finally attenuate, wrinkled margin black, and naked, the hypothecium brownish-black. Spores ovoid-ellipsoid, 16-24 by 8-10 mic.—*Schær. Spicil. p. 142* (*b* excl.) *Zw. exs. n. 129, a, b.* *Koerb. Syst. p. 247, not of Fries.*

b, flavocærulescens, Schær. ; thallus rimose, tinged orange-red by iron, as now also the margins of the apothecia, the disk black and very commonly naked.—*Schær. l. c. & Lich. Helv. n. 186. Anz. Lich. Ital. n. 184.*

Granitic and arenaceous rocks, common throughout the Appalachian regions, and early recognized, probably long before *Halsey, View, 1823 (e specim.)* New England, *Porter, 1838.* Mountains of Virginia, and North Carolina, *Curtis. Georgia, Ravenel. Alabama, Peters.*—*b, alpine and arctic regions. White Mountains, Tuckerman Syn. N. E. 1848. Greenland, Vahl, e Th. Fr. Arct.*—The diagnosis will be seen to cover the peculiarities of the var. *alpina*, Schær. *l. c. ; Lich. Helv. n. 185 ; Anz. Lich. Ital. n. 283* ; which, as regards the scarcely separable Italian lichen is the *L. phœnenterodes*, Nyl. in *Flora, 1875, p. 363.* But Schærer's plant is not at all easily to be distinguished from his *n. 471 L. albo-cærulescens, vulgaris*, Schær. ; as well as of Stizenberger, *Lich. Helv. p. 185*) and the pale disk occurs also in the common low-country lichen not only here, but in Europe (*Zw. exs. n. 129, B*, where the whole apothecium is now pale.)

20. (e) *L. platycarpa*, Ach. ; thallus sub-tartareous, thin, rugulose, then more or less rimose, glaucescent and ash-coloured, tinged now red by iron, at length and commonly obsolete, the black hypothallus commonly obsolete ; apothecia now small, but more frequently ample to large, solitary for the most part, sessile, black (in the alpine lichen now brownish-pallescens) commonly naked, from flat soon convex, turgid, and gibbous-irregular, and proliferous, the thick more or less flexuous-lobate margin finally excluded, the hypothecium brownish-black. Spores ovoid-ellipsoid, 14-21 by 6-10 mic.

—*Ach. L. U.* p. 173. *Schær. Spicil.* p. 136; *Lich. Helv.* n. 228. *Anz. Lich. Ital.* n. 288.

Granitic, and arenaceous, not excluding lime-rocks. White Mountains, alpine, and below, *Tuckerman*. Elsewhere in New England, *Frost*, &c. New York, *Gerard*. Ohio, *Lesquereux*. Virginia, and North Carolina, *Curtis*. The mountain specimens, and the others from New England are large-fruited, and shew all the characters of the fruit; the others are small-fruited, and less developed. The plant is perhaps best placed next after *L. albocæruleascens*.—According to Fries (*L. E.*, p. 301) *Patellaria macrocarpa*, DC. *Fl. Fr.*, refers to *L. platycarpa*, (as in part also, according to Dr. Th. Fries, *Scand.*, the specimens on rock of *P. albozonaria* of the same work) and the former name is adopted by Dr. Fries, *l. c.*, for the whole species-group (*L. contigua*); but this can hardly escape being called an undue preference of what has never been anything more than a vague designation for an unquestioned and generally accepted one. The other constituent of *Patellaria albozonaria* is, it appears, *Heterothecium grossum* (Pers.)

‡ ‡ *Fuscescentes*.

21. *L. atrobrunnea*, (DC.) Schær.; thallus squamulose-areolate, the sub-cartilaginous areoles scattered, or approximate, from flat, and at length lobulate, soon turgid, and from appressed ascendant and wavy, smooth and shining, then dull and at last cancellate-rugose, the edges blackening (or now abnormally whitened) the outer ones now elongated and the circumference effigurate, or black-fringed by the hypothallus, from yellowish becoming copper-and finally chestnut-brown; apothecia middling-sized to ample, closely sessile, flat, black and mostly without bloom, with a thickish, prominent, finally flexuous margin, but becoming tumid, and now conglomerate, within pale, but the hypothecium at length brown. Spores ellipsoid, 7-12 by 3-6 mic.—*Schær. Spicil.* p. 134; *Lich. Helv.* n. 444, *qu. vis.* *Fr. L. E.* p. 319.

Alpine and arctic granitic rocks. Greenland (*Vahl*) Th. Fr., *l. c.* 1861. Rocky Mountains, *Parry*. Sierra Nevada, *H. Mann*. Yosemite Valley, California, *Bolander*. Mt.

Hood, *Hall.* Coast of Oregon, *Cusick.* Washington Territory, *Suksdorf* in hb. Sprague.

22. *L. Manni*, Tuckerm. *herb.*; thallus of thick, tartaceous, convex, smooth areoles which are crowded together into a close, olivaceous-brown crust, upon a black hypothallus; apothecia adnate, ample to large, flattish, gray-pruinose, the rather stout margin persistent, within generally as in the last, but the ellipsoid spores 11-16 by 5-7 mic.—

Volcanic rocks, Mt. Diablo, California, *H. Mann.* The texture and habit (somewhat suggestive, in the specimens, of scale-armour) together with the larger apothecia (reaching 3mm. in width) and spores, should seem to separate this lichen, even where the last preceding is so luxuriantly displayed as on the Pacific coast; but younger conditions from the same rocks (*Bolander*) shew at least (if I mistake not) that in its first beginnings the plant is less dissimilar to the other; and even the marked lighter colour contrasting strongly with that of genuine *L. atrobrunnea*, with which it grows, and the bloom of the apothecia, are not peculiar to it (*).—Reference should be made here to the confessedly doubtful *L. paupercula*, Th. Fr. *Scand.* p. 482, which is said by this writer to occur in Arctic America (Journ. Linn. Soc. Lond. 17, p. 68.)

23. *L. fusco-atra*, (L.) Fr.; thallus cartilagineous, squamulose-areolate, the areoles thin, at length closely approximate, flat, and for the most part a little hollowed, or, the edges being at length raised, wavy and sub-imbricate, somewhat lobulate, and more or less conspicuously angulate, smooth, chestnut, olivaceous-brown, and pallescent, upon a black now fringing hypothallus; apothecia middling-sized to ample, appressed, flat becoming tumid, the disk pruinose then naked, the thin, acute margin finally disappearing, the hypothecium blackish-brown. Spores ellipsoid, 8-16 by 5-7 mic.—*Fr. L. E. p. 316, exc. excip.; Lich. Suec. n. 385. Nyl. Scand.*

(*) There is no reaction of the hyphae with iodine, which, with those lichenologists who would justify in this way their far from natural, wide separation of *L. atrobrunnea* and *L. fuscoatra*, should lead to the still more difficult association of our plant with the latter of the species; but this is not the only evidence of the same sort afforded by the western specimens: and the test in question seems no more useful here than in the *contigua*-group.

p. 229. *L. sumosa* (Ach.) Schær. *Spicil.* p. 134.

Granitic rocks, as well alpine and arctic, as of lower regions. Arctic America (*Richardson*) Hooker, *l. c.*, 1823. *Vahl.* *Kane.* White Mountains, alpine, *Tuckerman.* Tadousac, Canada, *A. T. Drummond.* Vermont, *Frost.* Rocky Mountains, *Brandegee.* California, *Mann.* *Bolander.* Oregon, & northward, *E. Hall*, &c.

24. *L. insularis*, Nyl.; thallus tartareous, determinate (growing in small patches insularly among other lichens) verrucose, the warts confluent into a plicate, afterwards broken crust, tawny-brownish becoming brownish-ashcoloured and dark-brown, the hypothallus indistinct; apothecia small to minute, innate or commonly appressed, flat, with a black and naked disk and a thin, prominent, persistent margin, but soon crowded together, angulate and lirellate, the hypothecium dark-brown. Spores ellipsoid, 10-12 by 6-7 mic.—*Nyl. Bot. Not.* 1852. *Koerb. Syst.* p. 239. *L. intumescens*, Nyl. *Lich. Par.* n. 58; *Prodr. Gall.* p. 127; *Scand.* p. 231. *Th. Fr. Scand.* p. 528. *L. badia*, var., *Flot.*

Coast sandstones, California (*Bolander*) *Tuckerman Gen.* 1872.—The species first distinguished, and its expressive name given by Nylander. Flotow had already referred it to *L. badia*, but it is plainly absurd, that because he was sufficiently impressed by the lichen to separate it from other conditions of this species by a variety name (without description) of its own, he should be made author of the after-determined new species, which he did not recognize.

25. *L. fuscocinerea*, Nyl.; thallus "effuse, rimose-areolate, uneven, the areoles often verrucose and tuberculate, cinerascent or ashy-brown, on a black hypothallus: apothecia closely appressed or at length adnate, commonly flattish, and bordered by a thin, rather prominent margin, most often gyrose, variously flexuous and angulate, the hypothecium dark, the paraphyses concrete. Spores ellipsoid, 9-14 by 6-10 mic."—*Th. Fr. Scand.* p. 328. *L. atro-alaia*, *Fr. Lick. Suec.* n. 406, c. *L. tenebrosa*, Nyl. *Prodr.* p. 127. *Tuckerm. Gen.* p. 181?

Alpine granitic rocks, White Mountains, *Tuckerman, l. c.*, 1872.—The European plant, determined by the cited lichen of Fries, appears scarcely well referable to the next following species. Of ours very little is as yet ascertained, but I scarcely know where else to place the specimens, till Dr. Fries's diagnosis quoted above, shall help us to farther knowledge.

26. *L. tenebrosa*, Flot. ; thallus tartareous, rimose, the flat portions soon a little convex, and passing at length into quite detached, smoothish areoles scattered over the conspicuous, black hypothallus, from greenish-pale to dark-blackish lead-coloured; apothecia small, from innate adnate and appressed, black, the thin margin commonly persistent, the hypothecium pale. Spores (in somewhat cylindraceous thekes, among loose paraphyses) ellipsoid, 12-18 by 7-10 mic.—*Nyl. Prodr. p. 127. Th. Fr. Scand. p. 540. Aspicilia, Koerb. Parerg. p. 99. Anz. Lich. Ital. Sup. n. 212. Schær. Lich. Helv. n. 129.*

Granitic rocks. White Mountains.

27. *L. lugubris*, Sommerf. ; thallus coriaceous-cartilagineous, of more or less lobulate, opake squamules which are crowded together into a rugose-plicate crust, from rufous-brownish passing into blackish-ashcoloured; apothecia middling-sized to ample, sessile, flat, the disk black, opake, the stout, elevated margin brighter, persistent, the hypothecium brownish. Spores round, diam. 7-9 mic., in linear thekes, amid slender, loose paraphyses.—*Fr. L. E. p. 314; Lich. Suec. n. 351. Nyl. Scand. p. 232. Schæreria, Koerb. Syst. p. 232. Lecidea cinereo-rufa, Schær. Spicil. p. 122. Th. Fr. Scand. p. 419. Stenh. Lich. Suec. n. 175.*

Alpine, granitic rocks, White Mountains, *Tuckerman Gen.*, 1872.—It is proposed (*Th. Fr. Lich. Arct. p. 173; Scand. l. c.*) to change the long-determined and accepted name of this lichen, because the herbarium of Sommerfelt appears to shew that he confused it with what Nylander has since named *L. caudata*. But it is easier to suppose that the latter might be passed over as *L. lugubris*, than that Sommerfelt should have published a description of it as "coriaceous" and "lobate."

‡‡‡ *Ochroleucæ.*

28. *L. Armeniaca*, (DC.) Fr. ; thallus incrassated, tareous, rimose-areolate, the smooth, bright, scattered or crowded areoles soon turgid and plicate-rugose, and from pale-yellowish ochraceous, and rufescent with a coppery tinge (at length darkened and black-spotted—f. *nigrita*, Auctt.) bordered more or less and the circumference of the whole fringed by a conspicuous incrassated black hypothallus ; [apothecia from middling-sized large, innate in the areoles, flat, black and naked, immarginate, becoming turgid and irregular, dark within. Spores ellipsoid, 9-13 by 4½-6 mic.] —Fr. *L. E.* p. 319. Schær. *Spicil.* p. 126. Nyl. *Scand.* p. 229.

Alpine and arctic granitic rocks. Greenland (*Vahl*) Th. Fr., *l. c.*, 1861. Rocky Mountains, *Brandegee* in herb. Sprague, infert.

29. *L. aglæa*, Sommerf. ; thallus tartareous, incrassated, verrucose-areolate, the smoothish areoles soon turgid and wrinkled, and crowded into an uneven crust, pale ochroleucous, upon a black hypothallus ; apothecia middling to large, innate in the areoles, soon convex, naked and black, and immarginate, blackening within. Spores ellipsoid, 10-16 by 5-8 mic. —Sommerf. *Suppl. Lapp.* p. 144. Fr. *L. E.* p. 322. Schær. *Enum.* p. 124. *L. Brunneri*, Schær. *Spicil.* p. 136. *Anz. Langob.* n. 150.

Alpine and arctic granitic rocks. Greenland (*Vahl*) Th. Fr., *l. c.*, 1861. White Mountains, *Tuckerman*. Sitka, *Dr. Kellogg*.

30. *L. amylacea*, Ach. ; thallus tartareous, contiguous at length sub-rimose, the surface somewhat mealy, pale ochroleucous and white, upon a black hypothallus ; apothecia middling-sized to ample, from innate at length superficial, flat, with a thick margin, then elevated, turgid, and excluding the margin, the disk more or less pruinose, within pale. Spores ellipsoid, 7-10 by 4-6 mic. —Ach. *Syn.* p. 16. Nyl. *Scand.* p. 227. *L. elata*, Schær. *Spicil.* p. 137; *Lich. Helv.* n. 229. *Zw. exs.* n. 138.

Alpine rocks containing lime. Greenland (*Vahl*) Th. Fr., l. c., 1861. Utah, *Watson* in herb. *Sprague*.

† † *Spores 6-8-locular*:

31. *L. caudata*, Nyl. ; thallus rimose-areolate, passing now from the first into verrucose, ashy-brown, upon a black hypothallus ; apothecia small to middling-sized, sessile, flat, with a rather stout and persistent margin, and becoming very flexuous and lobed, or now soon convex and excluding the margin, black, the hypothecium brownish-black. Spores oblong, caudate-attenuate below, 5-8-locular, 32-40 by 5-6 mic.—*Nyl. Scand. p. 230, & in Fellm. exs. n. 192. Scoliciosporum, Th. Fr. Lich. Suec. n. 18. Toninia, dein Bilimbia lugubris, Th. Fr. Lich. Arct.; Scand. p. 387.*

Alpine granitic rocks. White Mountains, *Tuckerman Gen.*, 1872.

b. *Granulosæ*. *Lichens of various habitat: growing on stones not only, but on the earth, dead wood, and bark.* The group exhibits often a tendency to revert to *Biatora*; and the spores to pass beyond the simple type.

† *Stock of L. enteroleuca. Spores small, ellipsoid, simple.*

32. *L. enteroleuca*, Fr. ; thallus from rugose at length granulate-verrucose, finally often heaped, or now disappearing, glaucous and cinerascent, the hypothallus indistinct ; apothecia minute to middling-sized, adnate, soon and more commonly convex excluding the margin, black, the hypothecium now colourless but most commonly more or less fulvous, and finally darkening. Spores ovoid-ellipsoid, 9-17 by 5-9 mic.—*Fr. L. E. p. 331 quoad f. cortic., & L. sabuletorum, g, e, & f, quoad f. saxic. Tuckerm. Syn. N. E. pp. 67-8. Anz. Lich. Ital. n. 268. L. parasema, v. latypea, & v. enteroleuca saxic., Nyl. Scand. p. 217. L. elæochroma, a, & b, Th. Fr. Scand. p. 543.*

b, *theioplaca*, Tuckerm. ; thallus verruculose, pale-yellow ; the hypothecium fulvous and blackening.—*Gen. p. 179.*

c, *equata*, Floerk. ; thallus more continuous and even, rimose-areolate, ashcoloured ; apothecia from innate becoming superficial, the hypothecium (in ours) fulvous.—*Th. Fr. Scand.* p. 543. *Hepp. Lich. Eur.* n. 6.

d, *muscorum*, Koerb. ; thallus white, the hypothallus indistinct ; apothecia very black, flat with a rather stout margin, becoming convex, and confluent, the hypothecium fulvous.—*L. Wulfenii*, Koerb. *Parerg.* p. 216. *Anz. Langob.* n. 186.

e, *achrista*, Sommerf. ; thallus originally contiguous, from thin smoothish and rimulose at length verrucose as in a, from whitish now dark-ashcoloured, the hypothallus mostly indistinct ; the apothecia much as in a, but longer flat and at length flexuous, and the hypothecium always fulvous.—*L. enteroleuca*, a, *max. p.*, *Fr. L. E.* p. 331. *Koerb. Syst. p. 243.* *Stenh. Lich. Suec.* n. 243. *L. parasema*, a, *Nyl. L. elæochroma*, v. *achrista*, *Th. Fr. Scand.* p. 544.

f, *flavida*, Fr., Stenh. ; thallus thin, smoothish, rimulose, yellowish, limited and variegated by the black hypothallus ; apothecia finally much as in the next, the hypothecium fulvous and blackening.—*Stenh. Lich. Suec.* n. 113. *L. parasema*, v. *flavens*, *Nyl. L. elæochroma*, v. *flavicans*, *Th. Fr. Scand.* p. 544.

g, *ambigua*, Anz. ; thallus thin, glaucescent and cinerascent ; apothecia from livid-fleshcoloured rufescent, blackish with a thin gray bloom, and black, the hypothecium fulvous, and blackening.—*Anz. Lich. Ital.* n. 279. *Biatora ambigua*, *Mass. Ric.* p. 124; *Exs. n.* 333. *B. tabescens*, Koerb. *Syst. p. 203.*

Common, in one form or other, throughout North America, and though sufficiently and now remarkably various, offering, in the conformation and coloration of the crust, in the revertence now towards *Biatora* in the apothecia, in the hypothecium, and in the ovoid, often falsely-bilocular spores, and, it should be added, in the acicular and bowed spermatia, good points of recognition.—a is found on rocks and stones throughout, but my specimens very rarely show other than a coloured hypothecium. From this it is not claimed that *L.*

vitellinaria, Nyl., differs at all, except in being without thallus, and occurring, so far as known, only on that of *Placodium vitellinum*. It has been observed on the North Platte, *Dr. Hayden*.—b, serpentine and sandstone rocks, California, *Bolander*. Buhrstone, South Carolina, *Ravenel*. And, not very different, from granitic rocks, New Jersey, *Austin*.—c, on trap rocks, Grand Manan island, N. B., *Willey*. On brick, Pennsylvania, *Eckfeldt*. The distinction from this (as exhibited in the cited specimen of Hepp) of *L. monticola*, Koerb. *Parerg.* p. 224, and Hepp n. 262, a calcareous lichen, recognized in this country at Trenton, N. Y., by Mr. Willey, and also, in his specimens, by Dr. Müller Arg., is not yet sufficiently clear to me.—d, mosses &c. in alpine and arctic regions. White Mountains, *Tuckerman*. Islands of Behring's Straits, *Wright*. Anticosti, *Macoun*.—e, trees and shrubs throughout the United States and Canada, long known, but the older authorities uncertain.—f, on bark, and also dead wood, New England, *Russell*, &c.; its real range perhaps much the same as that of the last preceding.—g, bark, Washington Territory, *Suksdorf* in herb. Sprague. On dead wood, Oregon, *Hall*.—The above-chosen name of the present species is the oldest certain one; *L. parasema* being better referred to *Buellia*, and *L. elaeochroma*, Sommerf., Acharius's understanding of which was (as might be supposed) vague, as see Th. Fr. *Scand.* p. 549, &c., having been anticipated by *L. enteroleuca*, Fr.

33. *L. melancheima*, Tuckerm.; thallus cartilagineous, originally contiguous, becoming plicate-rugose and sublobulate, and verrucose, glaucous-white and cinerascent, the hypothallus indistinct; apothecia small to middling-sized, adnate, from flattish soon convex and the margin demiss, and disappearing, very black, and (for the most part) polished and shining, confluent at length and irregular, the hypothecium pale. Spores oblong-ellipsoid, 7-12 by 3-4 mic.—*Tuckerm.* *Syn. N. E.*, p. 68, & *Lich. exs. n. 138*. *Nyl. Scand.* p. 234, 312; *Lapp. Or.* p. 164. *L. sabuletorum*, *d. euphorea*, *Fr. L. E.* p. 340; & *Lich. Suec.* n. 154, not of *Floerk.* *L. eluta*, *Flot. in Koerb. Syst.* p. 246.

On dead wood, common throughout New England, but not

known as yet from the other Atlantic States. It has turned up in Colorado, *Brandegee* in herb. Sprague.—The above-cited description from the *Lichenographia Europaea*, which is authenticated by the published specimen ticketed, in my copy, by the illustrious author himself, leaves it quite beyond doubt what Fries's view of this lichen was in 1831, and we also know that he adhered to the view in his latest published revision of Swedish lichens (*Summa*) in 1847. And it is therefore impossible that Dr. Th. Fries should be other than mistaken in his assertion (*Lich. Scand.* p. 554) that the *L. elabens*, Fr. *L. E.*, p. 344, which the author placed next to, and declared "perhaps too near" the widely different *L. Friesii*, Ach., should yet represent—and that without any hint that such comparison had occurred to Fries—the same plant which four pages back he had described as a state of *L. sabuletorum*; neither his view of the different affinities of the two permitting this, nor (as we might suppose) the discrepant characters. We cannot talk of *L. melancheima* as having an "ochroleucous" thallus; nor pretend that its fruit is ever, like that of *L. Friesii*, rugose-plicate, or comparable with *Cliostomum corrugatum*, Fr.; and the name *elabens* is without meaning, as the disk holds its place perfectly well. A specimen of *L. elabens*, Fr., from the original locality (Femsjö in Sweden) sent many years since by Dr. Fries, is indeed before me, and perfectly confirms Fries's judgment above-cited as to the plant's being only an ill-exhibited *L. Friesii*. All three of the lichens named are cited (*Th. Fr. Scand.*) as occurring at Femsjö, and so may possibly occur together; but the author of the *Lichenographia Europaea* has left us no excuse for confounding them.

34. *L. vorticosa*, Koerb.; thallus granulose-verrucose, dispersed or heaped, or quite disappearing, whitish and cinerascent; apothecia middling-sized, appressed, flattish, the very black disk opake, the margin rather prominent, becoming flexuous and lobulate, the hypothecium brownish-black. Spores "linear-ellipsoid," 11-13 by 4-5 mic.; the conglutinate paraphyses intensely cæruleous above.—*Koerb. Syst.* p. 251, & *herb. Anz. Langob.* n. 553. *Th. Fr. Scand.* p. 515.

Granitic alpine and arctic rocks. Arctic America, *Th. Fries* in *Linn. Soc. Journ.*, 1879.

35. *L. pycnocarpa*, Koerb. ; thallus tartareous, verrucose-granulose, the warts more or less confluent and rugulose, white, the hypothallus indistinct ; apothecia very minute, flat, with a thin, entire, concolorous margin, densely conglomerate in small clusters, the hypothecium dark-brown. Spores ellipsoid, 10-12 by 3-6 mic. — Koerb. *Parerg. p. 213.* Th. Fr. *Scand. p. 555.* *L. symphorella*, Nyl. in *Flora*, 1870, p. 35.

Granitic rocks, Island of Grand Manan, N. B., *Willey*. A very similar lichen occurs on dead wood in the White Mountains ; but in this the apothecia are not quite black (blackish-brown.)

36. *L. cyrtidia*, Tuckerm. ; thallus of very minute, scattered, or finally crowded, scurfy granules, olivaceous-greenish, the hypothallus mostly indistinct, but now black and dendritic on quartz ; apothecia minute (0^{mm.}, 2-5) appressed, flat at first with a smooth margin, but this soon disappearing, and the fruit convex and immarginate, livid-black, the thick hypothecium blackish-brown. Spores ovoid-ellipsoid, 5-9 by 2-4 mic., the concrete paraphyses at length rather distinct, and brown-capitulate. — *Obs. Lich. 4, l. c., 12, p. 181.*

On various rocks, Missouri (*Hall*) Tuckerman, *l. c.*, 1877. Massachusetts, *Willey*. Illinois, *Wolf*. And, hardly differing, on dead wood, New Hampshire, *Willey*. — *L. ultima*, Th. Fr. in *Lond. Linn. Soc. Journ.*, 17, p. 363, from Arctic America, n. of 82°, seems scarcely to differ. — The last word has perhaps hardly yet been said as regards the European *L. sylvicola*, Flot., and *L. erratica*, Koerb. ; the first of which is taken to differ from the other in an only "blackening" rather than "very black" apothecium, which continues longer flat, and in a thicker hypothecium ; both characters of our *L. cyrtidia*. But *L. sylvicola* of Nyl., in *Norrl. Lich. Fenn.*, n. 145, differs from our lichen in larger, oblong spores. Authors are not agreed as to the reaction of the European plants with iodine. According to Th. Fries (*Scand. ad loc.*) both give a vinous-red reaction, which should seem to contrast with the intensely blue one afforded by *L. cyrtidia*. But Nylander (*Lapp. Or.*, p. 186) obtains a blue reaction from *L. erratica* ; and I observe the same in his cited specimen of *L. sylvicola*,

and, as well, in a specimen of the latter sent me by Koerber.

[*L. neglecta*, Nyl.; thallus of minute, sub-confluent, whitish-ashcoloured granules, forming a determinate, thin crust of an inch or more in diameter, which is not rarely somewhat effigurate at the circumference; apothecia very minute, superficial, flattish, opake, the obtuse margin at length disappearing, the hypothecium brownish. Spores oblong or fusiform-oblong, 8-11 by 3-4 mic.—*Nyl. Scand. p. 244.* *Th. Fr. Scand. p. 524.*

Incrusting the smaller mosses (*Grimmia*, *Andreaea*) in the Scandinavian countries, rarely fertile; *Nyl. l. c.*—Norwegian specimens (sterile, though from what is called an abundantly fertile station) in herb. Willey, sent by Dr. Fries, are very like an alpine lichen of the White Mountains, growing with *L. arctica*, which I have always regarded as that species infertile. But the low country furnishes a plant similarly constituted, the determinate and quasi-effigurate character being especially marked, growing on rocks, and always without fruit, which, common at the base of the White Mountains, has been found by Mr. Willey to extend to the south shore of Massachusetts; and is taken by him for a possible representative here of the European species above-described.]

†† *Stock of L. alpestris*. Spores oblong-ovoid becoming sub-fusiform, and now 2-4-locular. Alpine lichens, growing on the earth, and on mosses.

37. *L. arctica*, Sommerf.; thallus of minute, cartilagineous, at first discrete then heaped, globular granules, brownish-ash-coloured; apothecia small to middling-sized, immixt, globular, immarginate, very black, thinly gray-pruinose, at length tuberculate-irregular and conglomerate, the hypothecium brownish. Spores from ovoid becoming oblong and sub-fusiform, 12-24 by 7-9 mic.—*Fr. L. E. p. 342.* *Th. Fr. Scand. p. 548.*

b. *pallida*; thallus pale-ochroleucous.—*L. pallida*, *Th. Fr. Lich. exs. n. 21*; *Lich. Arct. p. 221*; *Scand. p. 539.* *Lecidella*, *Koerb. Parerg. p. 214.*

Upon mosses in alpine and arctic regions. White Mountains,

Tuckerman Syn. N. E., 1848. Greenland, *Vahl*, e Th. Fr., l. c. Islands of Behring's Straits, *Wright*. Mountains of Washington Territory. *Brandegee*.—b, “on the earth, and on rocks,” Greenland, *Vahl*, e Th. Fr. l. c. Sufficiently marked in colour, and the granules, in my specimens, coarser; but other differences scarcely appear, nor are noted in the descriptions.

38. *L. limosa*, Ach. ; thallus thinner than in the preceding and often somewhat indistinct, but becoming at length cartilaginous, and areolate-verruculose, brownish-ash-coloured; apothecia small to almost middling, adnate a little elevated, globular and immarginate, very black, naked, and smoothish, the hypothecium reddish-brownish. Spores ovoid and sub-fusiform, “9-18 by 4-6” mic.—*Nyl. Scand.* p. 221. *Th. Fr. Scand.* p. 538. *Lecidella borealis*, *Koerb. Syst.* p. 234. *Anz. Lich. Langob.* n. 183.

On naked earth, in alpine and arctic regions. It makes a part of *L. alpestris*, Th. Fr. *Arct.*, said there to occur in Greenland, *Vahl*; another constituent being the similar *L. assimilata*, *Nyl.*, to which I now refer the arctic American lichen elsewhere (*Gen.* p. 179) associated by me with *L. limosa* (*borealis*.) Both plants are probably North American.

39. *L. alpestris*, Sommerf., Th. Fr. ; thallus thickish, of crowded and heaped cartilaginous granules passing into a rimose-rugulose crust, whitish or cinerascent; apothecia small to middling-sized, appressed, soon convex and immarginate, livid-black and black, naked, commonly conglomerate, the hypothecium pale but more or less reddish-brownish. Spores oblong and sub-fusiform, simple, or 2-4-locular, “14-25 by 3-4” mic.—*Th. Fr. Scand.* p. 526. *L. alpestris, stenotera*, *Nyl. Stenh. Lich. Suec.* n. 214. *Nyl. Scand.* p. 221.

On the earth in alpine and arctic regions. Greenland, *Stizenberger Index hyperb.* 1876 ; and included also, according to Dr. Fries, in his *L. alpestris*, *Lich. Arct.*, said, generally, to occur in Greenland. More value than has been allowed seems to belong to the not uncommon bilocular structure of the spores, since this passes, regularly and not very uncommonly in the cited Swedish lichen into 3-4-locular.

40. *L. assimilata*, Nyl.; thallus granulose, or granulose-areolate, cinerascent; apothecia small to almost middling-sized, convex and immarginate, black, naked, the thick hypothecium dark-reddish-brown. Spores oblong, and sub-fusiform, often bilocular, 10-16 by 3-5 mic.—*Nyl. Scand. p. 221. Th. Fr. Scand. p. 521.*

On the earth in alpine and arctic regions. Islands of Behring's Straits (*Wright*) Tuckerman *Gen.*, 1872 (*non L. borealis.*)

41. *L. crassipes*, (Th. Fr.) Nyl.; thallus of minute, scattered, globular, whitish warts; apothecia small to middling-sized, flat at first and obtusely marginate, but soon convex and immarginate, opake, more or less distinctly stipitate, finally clustered, and variously irregular, the hypothecium reddish-brown, and blackening. Spores from ovoid becoming oblong and sub-fusiform, now bilocular, "10-16 by 3½-5" mic.—*Nyl. Lapp. Or. p. 104; & in Norrl. Lich. Fenn. n. 194. Th. Fr. Scand. p. 520. Helocarpon, Th. Fr. Lich. Arct. p. 178.*

Upon mosses in alpine and arctic regions. Arctic America, *Th. Fries* in *Lond. Linn. Soc. Journ.*, 1879.

††† Spores variously curved, 4-locular. A bark-lichen.

42. *L. acclinis*, Flot.; thallus rugose-verruculose, or sub-leprous, or scarcely any, cinerascent; apothecia small to minute, adnate, flat, thinly marginate, or now at length convex and the margin disappearing, the hypothecium pale. Spores (8-16 in the thekes) from obliquely ellipsoid more or less bean-shaped or S-shaped, 4-locular, 9-17 by 3-6 mic.—*Nyl. Scand. p. 219. Hepp. Fl. Eur. n. 281. Arthrosporum, Mass.; Koerb. Syst. p. 270. Th. Fr. Scand. p. 584.*

Bark of Poplar, Massachusetts & New Hampshire, *Willey.*

*** *Sporostatia*. Spores very minute and numerous in the thekes.

43. *L. Morio*, Schær.; thallus areolate, the discrete,

flattish areoles soon a little convex or even wart-like, smooth and shining, yellowish-copper-coloured, those of the circumference more or less radiant, and fringed also by the black hypothallus in which they are mostly immersed; apothecia minute to almost middling-sized, depressed and scarcely surpassing the areoles, at length irregularly convex, often papillate, and now gyrose-plicate, the hypothecium pale to dark-reddish-brown. Spores globular, and ellipsoid.—*Schær. Spicil. p. 183, a. Fr. L. E. p. 319. Sporastatia, Mass., Koerb. Syst. p. 265, a. Anz. Lang. n. 164, a. Biatorella sp., Mass., olim; Th. Fr. Scand. p. 403.*

b, *coracina*, Schær.; areoles blackening.—*Schær. l. c. Fr. l. c.*

Alpine and arctic rocks. White Mountains, *Tuckerman* Syn. N. E. 1848. Rocky Mountains, *Parry*. Sierra Nevada, California, *Bolander*.—b, Arctic America, *Dr. Kane*; *Th. Fries* in *Lond. Linn. Soc. Journ.*, 1879.

L I.—BUELLIA, De Not., Tuckerm.

Apothecia patellæform. Spores ellipsoid, from simple (rarely sub-persistent n. 18) bilocular often by constriction S-shaped (§ * & § **) or now quadrilocular (n. 10, 11, 20, 33-36) or muriform-multilocular (n. 21, 25, 27) brown, but now decolorate. Spermatia oblong, or staff-shaped, on simple sterigmas. Thallus now lobulate (§ *) but, for the most part, uniform.—Some remarks on the analogy and value of the group, which is to *Lecidea* as *Rinodina* to *Lecanora*, may be found in the author's *Genera Lichenum*, p. 184. As here understood, *Buellia* affords the fullest exhibition of the differentiation of the brown spore.

* *Catolechia*. *Thallus from rugose plicate, reduced now to glebous-squamulose, at length lobulate. Spores bilocular, brown.*—The group corresponding here to the section *Toninia* in *Lecidea*.

1. *B. epigæa*, (Pers.) Tuckerm.; thallus rosulate, sub-

stellate, many-cleft, white, mealy, reduced now to scattered lobules; apothecia small to middling-sized, sub-sessile, flat, but the brownish-black or black, opake disk at length convex and excluding the prominent margin, which is suffused at first more or less by the thallus, the hypothecium brown. Spores ellipsoid, bilocular, 12-18 by 6-9 mic.—*Lecidea*, Schær. *Spicil*, p. 118. *Fr. L. E.* p. 290. *Hepp, Lich. Eur.* n. 144.

Upon the earth in calcareous regions. Bad lands of Judith, Nebraska, and on the North Platte river, Wyoming, accompanying, as in Europe, *Placodium fulgens* (Hayden) Tuckerman *Gen.*, 1872. Montana, growing with *Biatora decipiens*, *M. A. Brown*.—Acharius confused this with the similar *Placodium candicans*, Dub.; and his description of the fruit has been regarded as belonging wholly to the latter: but the apothecia of *Buellia epigaea* occur also dark-brown.

2. *B. bolacina*, Tuckerm. herb.; thallus of scattered, turgid, wavy and plicate, glebous squamules (1-2^{mm.} wide) from greenish-glaucous at length white; apothecia small (scarcely reaching 1^{mm.} in width) adnate, plano-convex, opake, sub-immarginate, the demiss margin soon disappearing, the hypothecium blackening. Spores ellipsoid, bilocular, 12-20 by 6-10 mic., the well-developed paraphyses loose, and brown-headed.

On the earth, in "mesas," San Diego, California, *Dr. Cooper*. In the same habitat, Lower California, *Mr. Orcutt*.

3. *B. badia*, (Fr.) Koerb.; thallus of glebous, now crenate-lobate and imbricate, and now reduced, flattened, and areolar squamules, tawny, and olivaceous-brown; apothecia small to middling-sized, adnate, flat, the disk opake, the irregular margin prominent but at length excluded, the hypothecium brown. Spores ellipsoid, bilocular, 8-16 by 5-9 mic.—*Koerb. Syst.* p. 226. *Tuckerm. Gen.* p. 185. *TA. Fr. Scand.* p. 588. *Lecidea*, *Fr. L. E.* p. 289, a. *Nyl. Scand.* p. 238. *L. Dubenii*, *Fr. Zsc. exs. n.* 119.

Decayed mosses on rocks, Yosemite valley, California (*Bolander*) Tuckerman *l. c.* 1872. Washington Territory, *Suksdorf*. Rocks, Kansas, *Hall*.—The lichen occurs also,

in Europe, parasitic on the thallus of *Parmeliae*; *L. badiella*, Nyl. *Pyren!* p. 12 ("fere varietas," *l. c.*) being scarcely distinguishable from such states. The spores of our plants exceed those of the Pyrenæan, but are rather smaller than those of the other European specimens before me.

4. *B. pulchella* (Schrad.) Tuckerm.; thallus of turgid squamules which are crowded together into a gyrose-plicate crust, and become explanate and undulate-lobate at the circumference, greenish-yellow (palescent with age) upon a black hypothallus; apothecia middling-sized to ample, sunken among the squamules or superficial and sub-sessile, flat at first and obtusely flexuous-marginate, but finally tumid, and the margin obsolete, often conglomerate, and confluent, the hypothecium black. Spores ellipsoid, bilocular, "10-17 by 7-10" mic.—*Lecidea Wahlenbergii*, Ach. Schær. *Spicil.* p. 118. *Fr. L. E.* p. 290. *Stenh. Lich. Suec.* n. 213.

Moist, shaded, alpine, and arctic rocks. Arctic America (*Richardson*) Hooker, *l. c.* 1823.—The smaller lichen, agreeing in the colour of its plicate but less developed thallus, and referred here (as a depauperate form) in the *Syn. Lich. N. Eng.*, p. 64, as not uncommon in moist fissures of rocks, at the summits of the White Mountains (*Tuckerman*) as of the Adirondack mountains, N. Y. (*Peck*) has never occurred in fruit, and its place is indeterminable. The habit of growth of the lichen suggests also the alpine *Catolechia Hookeri* of European mountains, unknown here.

** *Eubuellia*. *Thallus uniform.* Spores brown, in the larger number of species, typically bilocular, but passing, rarely, from such conditions into 4-6-locular ones (*n. 11*) always 4-locular in *n. 20*; 4-locular breaking at length into plurilocular in *n. 10*; and finally reaching the extreme of development of the brown spore, in muriform-multilocular, in *n. 21*.—The section affords thus a very rich and instructive exhibition of this important type of spore.

† *Glaucescentes*.

5. *B. retrovertens*, Tuckerm. *in litt.*; thallus of small, separate, smooth, here and there sub-lobate, soon convex

areoles, glaucescent; apothecia minute (0^{mm.}, 3-5 in width) adnate, the black disk soon convex, and the brown but blackening margin demiss, and disappearing, the hypothecium brownish-black. Spores ellipsoid, bilocular, 10-17 by 7-8 mic. ; the at length distinct paraphyses brown-headed.

Granitic rocks, Rocky Mountains in Colorado, *Brandegee* in herb. Sprague. Too little is known of this. The thallus at once suggests that of *Lecanora calcarea*, v. *contorta*, as, more distantly, that of the graniticoline *L. cinerea*, v. *gibbosa*, but this is also true of the Pyrenæan *Lecidea squamulata*, Nyl., *Obs. Pyr.* p. 58, as described, which should differ but little from ours, except that no mention is made of the important fact that the margin of the exciple in the latter is originally pale. Is it possible that the Europæan lichen should be better comparable with *Buellia saxatilis* than with *B. spuria*? And is ours also parasitic?

6. *B. stigmæa*, Tuckerm. *in litt.*; thallus originally contiguous, but passing, from the first, into rimose-areolate, smooth and even, limited and decussated by the blackening hypothallus; apothecia minute (0^{mm.}, 2-5 in width) adnate, flat, the black, naked disk bordered by a thin, persistent margin which is originally of the colour of the thallus but soon blackens, the hypothecium dark-brown. Spores ellipsoid, bilocular, 11-15 by 5-6 mic. ; the concrete, slender paraphyses at length distinct, not capitate, and scarcely coloured above.

Quartz rock, Pennsylvania, *Michener*. On the same rock, Weymouth, and New Bedford, Mass., *Willey*. South Carolina, *Eckfeldt*.—The thallus here appears certainly not foreign. The apothecia suggest rather *Rinodina*. Spermogones not seen.

7. *B. lepidastræ*, Tuckerm. ; thallus tartareous, squamulose-areolate, glaucescent, the flat, soon dilated areoles undulate-lobate and crenulate, discrete, but crowded at length into a broken, or now rimulose, or even verrucose crust, the hypothallus confused, or obsolete; apothecia small, adnate, flat, naked, but the thickish margin finally disappearing, and the fruit heaped, and proliferous, the hypothecium dark-brown. Spores ellipsoid, bilocular, 10-20 by 6-8 mic., the agglutinate paraphyses at length more distinct, brown above.—*Suppl. I, l. c. p. 429.*

On various rocks, Vermont (*Frost*) Tuckerman l. c. 1858. Massachusetts, *Tuckerman*; *Willey*. Alabama, *Peters*.—Other lichens, from Texas, *Wright*; New Mexico, *Brandegee*; and California, *Bolander*, come very near. The New England plant, originally published, is remarkable for its much dilated areoles (commonly exceeding 2^{mm.}, running together into larger ones exceeding 4^{mm.} in width) which are decidedly squamaceous; but these occur also smaller, and the principal distinction of the Californian lichen from conditions referable (in the present writer's view at least) to *B. spuria* is the entire disappearance of the black hypothallus of the latter; the larger spores of the former being probably of less account.

8. *B. spuria* (Schær.) Arn. ; thallus tartareous, the small, flat, or at length a little convex, more or less black-edged, multangular areoles, either dispersed upon the conspicuous black hypothallus, or crowded together into a chinky crust, glaucescent, and cinerascent; apothecia small, innate-sessile, mostly flat, the rather prominent margin at length flexuous, or the disk papillate, and rugose, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 9-16 by 4-8 mic.—*Lecidea*, Schær. *Spicil.* p. 127. *Hepp Fl. Eur.* n. 33. *Buellia spuria*, a, *Anz. Catal. Sondr.* p. 87; & *Lich. Langob.* n. 194. *B. spuria*, a, & *B. lactea*, Koerb. *Parerg.* p. 183. *Lecidea lactea*, *Hepp*, n. 751. *Buellia lactea*, *Tuck. Gen.* p. 186 (specim. *Californ.* excl.) *Lecidea atro-albella*, *Nyl.* ! in herb.

Granitic and other rocks, common. New England, *Tuckerman* l. c. 1872. New Jersey, *Austin*. Pennsylvania, *Michener*. Missouri and Kansas, *Hall*. Georgia, *Ravenel*. Alabama, *Peters*.

9. *B. stellulata* (Tayl.) Br. & Rostr. ; thallus thin, made up of minute, flat or a little convex, scattered or crowded areoles, glaucescent or cinerascent, upon a black hypothallus; apothecia minute and very minute, adnate and immixt, flat, the commonly persistent margin at length disappearing, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 7-13 by 4-7 mic.—*Th. Fr. Scand.* p. 603. *Lecidea*, *Taylor* *fide Borr. ! Leight. Lich. Fl. Brit.* p. 304. *L. spuria v. minutula*, *Hepp Fl. Eur.* n. 313.

On various rocks. California (*Bolander*) Tuckerman *Gen.*, 1872. Tennessee, *Ravenel*. New Jersey, *Austin*. Massachusetts, *Willey*.—The New Jersey lichen is coarser than those of Borrer and Hepp, which are the type of ours, but far more like the latter than one of the two specimens of the New Granada *Lecidea stellulata* of Nylander (*Lindig Lich. N. Gran.*, n. 156, Coll. 2) which is too near to *B. spuria*.

10. *B. albo-atra* (Hoffm.) Th. Fr.; thallus effuse, cartilaginous, contiguous soon rimulose, or now at length thickened and areolate-verrucose, glaucous-white, now mealy, the hypothecium brown. Spores ellipsoid, 4-locular but the cells at length irregularly divided, 10-20 by 5-9 mic.—*Lecidea*, Schœr. *Spicil.* p. 140. *Fr. L. E.* p. 336. *Diplotomma*, Koerb. *Syst.* p. 218. *Buellia*, Th. Fr. *Scand.*, p. 607.

b, *saxicola*, Fr.; thallus more or less determinate, and orbicular.—*Fr. l. c.*

Trunks, especially of Elm; less commonly also on dead wood. Pennsylvania, *Muhlenberg Catal.*, 1818. New York, and New England, *Halsey*. Canada, *A. T. Drummond*. Illinois, *Hall*. California, *Wright*. Oregon, *Hall*.—b, New England, on granite rocks and sandstone, *Tuckerman*. Kansas, on lime rocks, *Hall*. Texas, on lime rocks, *Wright*. Rocky Mountains, on Chalcedony pebbles, *Hayden*. California, on sandstones, (now peculiarly dispersed, *f. microbola*) *Bolander*. Hypothallus exhibiting a blackening fringe in specimens from gneiss, at Cape Elizabeth, Maine, *Tuckerman*; and some European specimens show perhaps traces of a similar discoloration of the edge of the periphery; as *Fr. Lich. Suec.* n. 413, upon a similar rock.

11. *B. parasema* (Ach.) Th. Fr.; thallus originally contiguous, at first and often persistently thin and smoothish, but soon rugulose, thickening, chinky, and at length areolate, or variously granulate, glaucous, cinerascent, or darkening (exceptionally also yellowish) limited more or less by the blackening hypothallus; apothecia sessile (varying also, in cases, to adnate and even innate) for the most part flat or flattish, and the commonly thin margin, which is at length

flexuous-lobate, persistent, but the opake disk (now exceptionally brownish, as also the margin; and now, in sub-tropical regions, gray-pruinose) at length turgid, and variously irregular, the hypothecium brownish-black. Spores ellipsoid, bilocular, very various in dimensions, 10-24 by 5-11 mic.—

Th. Fr. Scand. p. 589. *Lecidea, Fr. Sched. Crit.; & Lich. Suec. n. 215, 216.* *Fr. L. E. p. 330, max. p.* *Tuckerm. Syn. N. E. p. 67 (syn. Floerk. excl.) max. p.* *Stenh. Lich. Suec. n. 109, 110.* *L. disciformis, Nyl.*

b, *triphragmia*, Nyl.; spores from 2-becoming 3-4-6-locular.—*Scand. p. 236.*

Bark of trees, and on dead wood, throughout North America. *Muhlenberg Catal.* 1818 (*saltem pro p.*) *Halsey!* Arctic America, *Richardson.* Ohio, *Lea.* Illinois, &c., *Hall.* British Columbia, *Macoun.* Anticosti, *The same.* Southward from Maryland, and Virginia, *Tuckerman*, to the Carolinas, and Georgia, *Ravenel*, Florida, *Austin*, Louisiana, *Hale*, and Texas, *Wright.*—b may occur anywhere. I have observed it in specimens from Pennsylvania, Ohio, and Texas.—A rich, and much varied species. Beside the now yellowish tinge of the thallus, this occurs also rose-tinted (f. *rhodopolia*, Nyl. *N. Gran.*) in Florida (*Austin*) and now vermillion-tinted within (f. *endococcina*, Tuck. *herb.*) in Cuba (*Wright.*) Compared with those of the European lichen as noted, the spores of ours seem to be rather smaller, and this perhaps more marked in the specimens happening to be before me from the northern than in those from the southern States, but a larger view may correct this.—Acharius separated finally (*Syn.*) the present species and *Lecidea enteroleuca*; but left both, as Dr. Th. Fries has shown, and as was then in fact inevitable, confused. But Fée (*Meth. 1824*) describes in his *Suppl.*, 1837, the spores of his "*L. parasema*, Ach. *Syn.*," so as to leave no doubt that our *Buellia* was what he had in view. The same is true of Fries's *L. parasema*, *Sched. Crit.* (1826) and *Exsicc.*, before me. "*L. disciformis*, Fries," cited by Mougeot & Nestler, n. 745 (1823) as a synonym of *L. parasema*, Ach., has been adopted by Nylander in place of the other designation; but no better authority for the same appears, which is also invalidated precisely as the

earlier one.—Mougeot & Nestler's specimens of what they mean including also (and in Dr. Taylor's herbarium equally with my own) *L. enteroleuca*.

[A marginal note says: "re-write, and notice the large spores on dead wood, (and Hawaii, on bark.)" New Bedford specimens on rails, referred here by Professor Tuckerman, have spores as large as those of *B. dialyta*.]

11 (c) *B. papillata* (Sommerf.) Tuck. ; thallus incrusting, from thin and membranaceous soon granulate, and finally thickened, tartareous, and rugose-verrucose, whitish or very white, the hypothallus indistinct ; apothecia middling-sized, superficial, from flat, with an opake, at length scabrous and tuberculate (now brownish) disk and an obtuse margin, soon convex, swollen, and confluent-irregular, the hypothecium brownish-black. Spores from ellipsoid passing into sub-fusiform, 2-4-locular, 18-30 by 7-14 mic.—*Tuckerm. Gen. p. 186. Lecidea, Fr. L. E., p. 336. Buellia insignis, Koerb. Syst. p. 230. Th. Fr. Lich. Arct. p. 227. Anz. It. Sup. n. 292. B. parasema, d, e, f, Th. Fr. Scand. p. 590.*

b, *albo-cincta*, Th. Fr. ; the margin, and now the disk also of the apothecia white-powdery.—*Th. Fr. ll. cc.*

Upon dead mosses, &c., in alpine and arctic regions. Greenland, (*Vahl*) Th. Fr. *l. c.* 1861. Rocky Mountains, *Parry*, &c. Mountains of Washington Territory, *Brandegee*. —b, Islands of Behring's Straits, *Wright*. Mountains of Washington Territory, *Brandegee*.—The lichen is perhaps rather better characterized than the analogous form of *Lecidea enteroleuca*; and has all but universally been accepted as a species.

11 (d) *B. leptocline* (Flot.) Mass. ; "thallus tartareous, thickish, rimulose-areolate, dirty-whitish, limited more or less by the black hypothallus ; apothecia sessile, the disk flat becoming tumid, black, naked, the prominent, soon flexuous margin finally excluded." *Koerb.* "Hypothecium blackish-brown. Spores ellipsoid, obtuse at each end, bilocular, scarcely constricted at the middle, 12-16 by 6-9 mic." Th. Fr.—*Koerb. Syst. p. 225. Mass. Lich. Ital. n. 347.*

Rabenh. Lich. Eur. n. 110. Anz. Lich. Etrur. n. 31. Th. Fr. Scand. p. 598. Lecidea, Nyl., in Norrl. Lich. Fenn. n. 199.

A black, limiting hypothallus, however now obsolete or deficient, as in muscicoline and lignicoline states, may perhaps be taken for characteristical of *B. parasema*; and *B. halonia* constituting in this view, an ochroleucous rock-form, suggests at once the probability of a glaucescent one, occurring also with us. The European lichen varies from a nearly crustless state with thin, wavy apothecia (Hepp, n. 311, recognized by all) to a handsome rimose-areolate one (*L. leptoclinoides*, Nyl., *Lich. Pyren. n. 65*) which I cannot but follow the eminent author in considering scarcely distinguishable. To this approaches nearly a well-developed member of the present stock from the Galapagos Islands (*T. Hill* in *Exp. Hassler*) and another, not remote, but comparable rather with the cited plant of Anzi, is exhibited in the Chilian *L. disciformis*, Nyl. *Chil.!* p. 166; this author not then separating the rock-forms of *B. parasema*. But we do not yet know *B. leptocline* as North American, unless an Oregon specimen (Cusick, in *herb. Sprague*) be referable to it.—*B. vilis*, Th. Fr. Scand. p. 599, is said by this author to be "exceedingly near akin" to *B. leptocline*, notwithstanding the remarkable difference of a colourless hypothecium; and of this (originally found in Spitzbergen, but since traced to Norway and Sweden) "a few apothecia" are said by Dr. Fries (*Jour. Linn. Soc. Lond., l. c.*) to have occurred to him upon stones from Arctic America.

11 (e) *B. halonia* (Ach.) Tuck. ; thallus sub-cartilagineous, rimose-areolate, the smooth, angulate areoles soon wavy and variously irregular, pale-greenish-yellow, upon a black, limiting hypothallus; apothecia middling-sized, appressed, soon convex, and tumid, and the thin margin excluded, more or less æruginous-pruinose, the hypothecium dark-reddish-black. Spores ellipsoid, bilocular, 11-16 by 6-8 mic.—*Lecidea, Ach. L. U. p. 163. Buellia, Tuck. Gen. p. 186.*

Coast-rocks, California (*Bolander*) Tuckerman, *l. c.* 1872.

11 (f) *B. Semitensis*, Tuck. *herb.*; thallus tartareous,

rugose-verrucose, sulphur-yellow (and pallescent) the hypothecium indistinct; apothecia middling-sized to ample (0^{mm.}, 7-1^{mm.}, 5) adnate, flattish with an obtuse margin which is now early demiss and disappearing, naked, the hypothecium much as in the last. Spores also similar but larger, 14-28 by 7-10 mic., the rather lax paraphyses reddish-brown above.

Granitic rocks, Yosemite Valley, and elsewhere, California, *Bolander*.

12. *B. dialyta* (Nyl.) Tuck. ; thallus effuse, very thin, scurfy becoming granulose, and more or less at length compacted, white, on a white hypothallus ; apothecia minute (0^{mm.}, 2-5) superficial, a little convex, immarginate, scabrous, the hypothecium dark-reddish-brown. Spores fusiform-ellipsoid, bilocular, 19-31 by 7-11 mic. — *Lecidea*, Nyl. in *Flora*, 1869, p. 123. *Buellia*, Tuck. *Gen.* p. 187.

On bark of *Pinus contorta*, California, *Nylander*, l. c. 1869 ; *Bolander*. On Hemlock Spruce, Vermont, *Russell*. On the same bark, as also on rails of dead White Cedar, and on Pitch Pine cones, Massachusetts, *Willey*. Hemlock bark, Western New York, *Miss Mary L. Wilson*.

13. *B. Elizæ*, Tuck. ; thallus effuse, made up of minute, scattered or crowded, rounded, greenish-glaucous granules, upon a white hypothallus ; apothecia small to minute (0^{mm.}, 3-7) adnate and immixt, flat, the disk orange-red, at length blackening and convex, excluding the at first prominent, thin, black margin, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 9-15 by 4-7 mic., the paraphyses agglutinate. — *Gen.* p. 187. *Lecidea*, *Suppl.* 1, l. c. p. 428.

On Pine bark, South Eastern Virginia, *Tuckerman*, l. c., 1858. On Pine bark, Vermont, *Frost*. On White Cedar bark, and dead wood, Massachusetts, *Willey*.

‡ ‡ *Fuscescentes*.

14. *B. pullata*, Tuck. ; thallus rimose-areolate, the minute, angulate areoles more or less concave and sub-crenate, but passing finally into a close, rugose-verrucose crust, dark-

olivaceous-brown, the hypothallus indistinct; apothecia small (0mm., 4-7) sessile, flat, naked, becoming angulate and difform, with a thin, prominent margin, which disappears as the disk becomes finally tumid, the hypothecium brownish-black. Spores ellipsoid, bilocular, 12-18 by 5-9 mic.—the paraphyses at length distinct, and brown-capitulate.—*Lich. Calif.* p. 26.

On various rocks, coast of California (*Bolander*) Tuckerman, *l. c.* 1866.—A well-marked lichen: but *B. myriocarpa*, however not commonly reckoned a member of the brown series, is yet associative with it, and sufficiently various; and saxicolous states of the latter (Massachusetts) if we may not also add corticolous, European ones, certainly suggest that the Californian plant may be only a pronounced (*Pacific*) form of the same.

15. *B. myriocarpa*, (DC.) Mudd; thallus thin, scurfy, or compacted at length into a rimulose, becoming sub-tartareous and rugose-verrucose crust, greenish-ashcoloured, now obsolete; apothecia minute, from flat, with a thin, distinct margin soon convex and immarginate, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 7-16 by 4-8 mic.—*Mudd Man.* p. 217. *Th. Fr. Scand.* p. 595. *Lecidea, Nyl. Scand.* p. 237; *Lich. Par. n.* 61. *L. chloropolia, Fr. Summ.* p. 115, & *herb.*

b, *polyspora*, Willey; spores 12-24 in the thekes.

On trees and shrubs; and common also on dead wood, stones, &c. Greenland, (*Vahl*) Th. Fr. *l. c.* 1861. Canada, *Macoun*. New England, *Tuckerman*. New York, *Peck*. New Jersey, *Austin*. Illinois, *Hall*. Alabama, *Peters*. Washington Territory, *Suksdorf*.—b, Massachusetts, *Willey*.—The variety should be compared with *B. dives*, Th. Fr. *Scand.* p. 594.—The hypothecium of what is otherwise referable to *B. myriocarpa* varies much now, in the same specimen, in depth of colouration; and the disk is also now pallescent, at least when wet.

16. *B. turgescens*, (Nyl.) Tuck.; thallus areolate-verrucose, the more or less tumid warts crowded at length into a sub-

plicate crust, brownish-ashcoloured commonly a little rufescent (and pallescent) the hypothallus obsolete; apothecia minute, adnate and immixt, flattish, the thin margin sub-persistent, but finally excluded, the hypothecium and paraphyses much as in the last. Spores ellipsoid, bilocular, 9-14 by 5-7 mic.—*Lecidea, Nyl. in litt. (nomen.) Buellia, Tuck. Gen. p. 187.*

On dead wood, New England, common, *Tuckerman, l. c. 1872.*—The conspicuous turgidity subsides at length; and it may prove doubtful whether to refer a lichen to a condition of this, or of *B. myriocarpa*.

17. *B. Schaeereri*, De Not.; thallus sparse, scurfy, becoming minutely granulose, or often obsolete, brownish-cineraceous; apothecia minute and very minute, flat, the disk now papillate and plicate, turgescent at length and the thin margin disappearing, the hypothecium brownish-black. Spores ellipsoid, bilocular, 8-11 by 3-4 mic.—*De Not. Framm. in Giorn. Ital. 1846, p. 199. Koerb. Parerg. p. 192. Lecidea nigritula, Nyl. Scand. p. 238; Lich. Par. n. 62.*

On dead wood, White Mountains, *Tuckerman, Gen. 1872.* On the same, Massachusetts, *Willey*; and New Jersey, *Austin.* Western New York, *Miss Mary L. Wilson.*

18. *B. coracina*, (Hoffm., Moug.) Th. Fr.; thallus rimulose-areolate, or the areoles at length verruculose and scattered, ashy-black on a black hypothallus; apothecia small, appressed, the disk more or less greenish-pruinose, soon convex and the uneven margin excluded, the hypothecium brownish-black. Spores ellipsoid, not uncommonly and now mostly simple but at length bilocular, dark-brown, varying much in size, 7-18 by 5-10 mic.—*Lecidea, Nyl. Prodr. Gall. p. 126; Scand., p. 232; & in Fellm. Lich. art. n. 193. Buellia moriopsis, Mass., Th. Fr. Scand. p. 606.*

Alpine, and arctic rocks. White Mountains, *Tuckerman Gen., 1872.* Chin of Mansfield, Vermont, *Frost.* Arctic America, *Dr. Kane.*

† † † *Ochroleucae.*

19. *B. Caloosensis*, Tuck. herb.; thallus of very minute, globular, more or less heaped, and finally sub-confluent granules, greenish-strawcoloured, on a white (blackening?) hypothallus; apothecia minute (0^{mm.}, 3-5) appressed, thin, flat, livid-blackening, opake, finally a little convex, and the thin margin disappearing, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 7-12 by 3-5 mic.

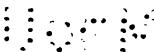
On trees. Caloosa river, Florida, *Austin*. Alabama, *Peters*. Texas, *Wright*.—The colours, and small spores distinguish it.

20. *B. vernalis*, Tuck.; thallus of minute, rounded, scattered, or now more or less crowded and confluent granules, passing finally into a rimulose crust, greenish-strawcoloured, limited more or less by the blackening hypothallus; apothecia minute (0^{mm.}, 2-5) appressed, and adnate, thin, flat, the disk livid and blackening, the thin, prominent, persistent margin at length flexuous-irregular, the hypothecium blackish-brown. Spores dactyloid, 4-locular, 12-16 by 4-5 mic., the paraphyses finally loose.—*Gen. p. 187. Lecidea, Suppl. I, l. c. p. 429.*

On various rocks. New England (*Oakes*) Tuckerman, *l. c. 1858*. New Jersey, *Austin*. Pennsylvania, *Michener*. South Carolina, *Ravenel*. Alabama, *Peters*. Also on trees and shrubs, Massachusetts, *Willey*.

21. *B. oidaea*, Tuck.; thallus contiguous, from thin, cartilagineous, and smoothish, soon rimulose, thickened, and rugose-verrucose, yellowish-glaucous, limited by the black hypothallus; apothecia middling-sized to ample (0^{mm.}, 8-2^{mm.}) sessile, the disk opake, soon tumid, and the obtuse margin early excluded, the hypothecium brownish-black. Spores from solitary, when they reach 46-88 by 18-24 mic., occurring also in 2^o, 3^o, 4^o, 5^o, 6^o, and 8^o, and the average of the smaller spores 30 by 16 mic., muriform-multilocular (transverse series of cells 8-12, longitudinal, in the middle, about 4) the slender, lax paraphyses brown-headed.—*Gen. p. 189. Lecidea, Obs. Lich. I, l. c. 4, p. 383.*

b, *penicula*, Tuck.; thallus white; apothecia much reduced.



Spores (in 5" & 8") not exceeding 18-23 by 10-13 mic., the transverse series of cells only 4.—*Buellia*, Tuck. Gen. l. c.

Bark of Oaks, California (Wright) Tuckerman, l. c. 1860. Spruce and Pine bark in the same state, *Bolander*. On various bark, Oregon, Prof. Newberry Hall.—b, on Spruce, Yosemite Valley, *Bolander*. On the same, Washington Territory, *Suksdorf*.—This instructive lichen beautifully exhibits the history of the muriform spore.

* * * *Rhizocarpon*. *Thallus uniform; but the areoles passing into squamules in n. 26. Spores very commonly and now persistently decolorate, surrounded by a halo, now short-ellipsoid and bilocular (n. 22, 23) and now more oblong and 4-locular, passing into muriform-multilocular.*

22. *B. Rittokensis*, Hellb.; “thallus constituted of discrete, sub-orbicular, flattish, or commonly concave areoles, the edges of which are raised and often white-powdery, dark-brown when dry and olivaceous-brown when moist, and scattered over a black hypothallus; apothecia adnate or sessile, naked, long and persistently flat, and thinly marginate, but at length convex and inmarginate, the hypothecium brownish-black. Spores obtuse-ellipsoid, bilocular, 23-30 by 12-16 mic.” *Rhizocarpon, Th. Fr. Scand. p. 615.*

Rocks, Cape York, Arctic America, ‘sterile, but the determination certain’, Th. Fr. in Journ. Linn. Soc. Lond. 17, p. 364, 1879.

23. *B. colludens*, (Nyl.); thallus of minute, depressed areoles, which are now scattered, but more often crowded together into a close, thin, rimulose-rugulose crust, brownish-ashcoloured, and gray, limited by the black hypothallus; apothecia small to middling-sized, sub-sessile, flat, naked, with a thin, elevated margin, the hypothecium blackish-brown. Spores ellipsoid, bilocular, 14-25 by 7-12 mic., mostly colourless or nearly so.—*Lecidea atro-alba, v. chlorospora*, Nyl. *Scand. p. 233. Buellia atro-alba*, Tuck. Gen. p. 186, *omnino*.

Rocks, common. New England, Tuckerman. Canada, A. T. Drummond. Pennsylvania, Michener. Virginia,

Curtis.—First separated by Nylander. Fries distinguished in his *Lecidea atro-alba* a v. *appplanata* for which he cited his *Lich. Suec.* n. 382 (*Summ.* p. 116.) But this specimen covered two forms—B, & C—which now prove, according to Dr. Th. Fries (*Scand. in loc.*) to relate to distinct species, and it can hardly then be made to support the “*Rhizocarpum appplanatum* (Fr.)” of Th. Fr. *Scand.* p. 618; even supposing that the author by whom it is thus proposed to supplant the real determiner of *B. colludens*, had not distinctly precluded such use of his name.

24. *B. badio-atra*, (Fl., Schær.) Koerb.; thallus tartaceous, areolate, the areoles for the most part convex and wartlike, scattered on the black hypothallus or now crowded, opake, more or less brown now rufescent, and now gray; apothecia small to middling-sized, appressed and adnate, flattish, naked, the margin obtuse, the hypothecium blackish-brown. Spores ellipsoid, bilocular, “27-36 by 11-18” mic. —*Koerb. Syst.* p. 223. *Anz. Ital.* n. 291; *Lang.* n. 191. *Lecidea*, *Nyl. Rhizocarpon*, *Th. Fr. Scand.* p. 613.

Rocks in alpine and arctic regions. Greenland (*Vahl*) Th. Fr. *l. c.*, 1861. Otherwise unknown as yet to us, unless possibly in a condition (?) conspicuous for its nearly black, smooth, convex areoles, but not otherwise very different, found once by *Mr. Willey* in the forest-region of the White Mountains. The European lichen (as exhibited in *Anz.* n. 291, from which it is difficult to separate *Hepp* n. 34) agrees however, in external features, so nearly with common states of the species next following, that it may well be passed over for the latter.

25. *B. petræa*, (Flot., Koerb.) Tuckerm.; thallus sub-tartareous, from contiguous and chinky becoming rimose-areolate, or now from the first verrucose, brownish at length blackish-gray, the blackening hypothallus often indistinct; apothecia from minute at length middling, for the most part innate and adnate, flat, with a thin, elevated margin which is finally excluded, the hypothecium brown. Spores (in 4", and 8") oblong-ellipsoid, from 4-locular at length muriform-multilocular, and from colourless at length blackish-brown, 24-40 by 8-18 mic.—*Rhizocarpon*, *Koerb. Syst.* p. 260. *Lecidea*, *Nyl. Scand.* p. 233.

b, *grandis*, Floerk. ; verrucose-areolate, the areoles tumid, from ashcoloured more or less violaceous-brownish, scattered upon the conspicuous black hypothallus, or crowded ; the apothecia immixt. — Koerb. l. c. Zwackh exs. n. 132. *Rhizocarpon grande*, Arn. Th. Fr. Scand. p. 624. *Lecidea atro-alba*, Fr. Lich. Suec. n. 406, B.

c, *Montagnæi*, Tuck. ; thallus of the preceding variety ; of which this is a condition with spores either solitary, or in twos in the thekes, and proportionately larger, or 24-54 by 18-30 mic., and more. — Tuck. Gen. p. 190. *Lecidea Montagnæi*, Flot. in Koerb. Syst. p. 258; Henn, n. 309; & *L. geminata*, Flot. l. c. p. 259. *L. atro-alba*, a, Fr. Lich. Suec. n. 406, A.

d, *albinea*, Tuck. in litt. ; thallus thickish, rimose-areolate, the coarse areoles flattened, disposed in dense clumps upon the black hypothallus ; apothecia sub-sessile, often pseudo-lecanorine, soon and commonly convex.

Common throughout our territory, on rocks, and now also on dead wood, and very variable. Greenland (Vahl) Th. Fr. l. c. 1861. Canada, A. T. Drummond. New England, Tuckerman. And, following the mountains, southward, Carolina, Curtis. California, Bolander. — b has the same range, — and c also, the locality of the Rocky Mountains (Hayden) being added for the latter. — d, is common, and conspicuous from New England to Virginia, Tuckerman. Longer study of the European lichen has led to the distinction, with more or less clearness, of other forms, with little doubt to be determined also here.

25 (e) *B. Oederi*, (Ach.) Br. & Rostr. ; thallus of minute areoles which are either flattened and at length crowded into a rimulose crust, or verruculose, rusty-red, the hypothallus obsolete ; apothecia minute, innate-sessile, angulate, flattish, the disk papillate and sub-plicate, the prominent margin more commonly persistent, the hypothecium brown. Spores oblong-ellipsoid, colourless, 4-locular, 12-20 by 6-10 mic. — *Lecidea*, Nyl. Scand. p. 234. *Rhizocarpon*, Kverb. Purery. p. 232. Th. Fr. Scand. p. 626. *Lecidea atro-alba*, v. *oxydata*, Fr. Lich. Suec. n. 384.

Alpine and arctic rocks, and in lower regions in high mountains. Greenland (*Vahl*) Th. Fr. l. c. 1861. White Mountains, and on the coast of Maine, *Tuckerman*.

26. *B. Bolanderi*, Tuck. ; thallus effuse, squamulose-areolate, the minute squamules cartilagineous, originally rounded, concave, soon lobed, the elevated margins black beneath ; apothecia small to almost middling, sessile, plano-convex, the opake disk finally turgid, and scabrous, and the obtuse margin disappearing, the hypothecium brownish-black. Spores solitary, or in 2^o, or 4^o in the thekes, ellipsoid, muriform-multilocular (the transverse series of cells 8-12, the longitudinal 4-5) from pale at length blackening, surrounded by a dense halo, 30-50 by 20-25 mic. ; the conglutinate paraphyses blackish-brown above. Spermatia staffshaped, 8-12 mic. long.—*Gen. p. 189.*

b, *sulphurosa*, Tuck. *herb.* ; squamules sulphur-coloured within.

Rocks, coast of California (*Bolander*) Tuckerman, l. c. 1872. Alpine county, Cal., *Lapham*. Oregon, *Hall*. Washington Terr., *Suksdorf*.—b, Oregon, *Cusick*.

27. *B. geographica*, (L.) Tuck. ; thallus sub-tartareous, the areoles either flattened and dispersed, mostly in clumps, or crowded together into a chinky crust (*f. contigua*) or verrucose, greenish to bright-yellow, upon a black hypothallus ; apothecia small, commonly crowded together in groups and thus angulate, between the areoles which they scarcely surpass, with flat disk, and thin, rather prominent margin, or the disk now convex and excluding the margin, the hypothecium brownish-black. Spores irregularly ellipsoid, from 2-4-locular and pallescent, blackening at length and muriform-pluri-locular, 17-40 by 9-16 mic.—*Lecidea, Schær. Spicil. p. 124. Fr. L. E. p. 320. Nyl. Scand. p. 248. Rhizocarpon, DC. Th. Fr. Scand. p. 622.*

b, *lecanorina*, Floerk. ; areoles scattered, tumid ; apothecia immersed in the areoles, and so bordered by them.—*Koerb. Syst. p. 263. Th. Fr. l. c.*

Rocks in alpine and arctic regions; and now also in lower Arctic America (*Richardson*) *Hooker*, *l. c.* 1823. Newfoundland, *Pylaiæ*. Canada, *A. T. Drummond*. New England, in the northern mountains, and descending to the coast of Maine, and to Sugarloaf, Deerfield, *Mass.*, *Tuckerman*. Mountains of North Carolina, *Buckley*. Rocky Mountains, *Brandegee*. California, *Bolander*. Oregon, *Hall*. Washington Terr., *Suksdorf*.—b, Island of Grand Manan, N. B., *Willey*; and very marked in California, *H. Mann*.

27 (c) *B. alpicola*, (Wahl., pro. p.) *Anz.*; areoles as in *B. geographica*, but larger and much in dense clumps; apothecia middling-sized, soon elevated and from adnate subsessile, at length convex. Spores short-ellipsoid, bilocular, brown, 10-18 by 7-9 mic.—*Lecidea*, *Nyl. Prodr.* *p. 142*. *Scand.* *p. 247*. *Buellia*, *Anz. Catal. Sondr.* *p. 90*. *Lecidea geographica*, *v. alpicola*, *Schær.*, *Fr.*, *Koerb.*, & *Auctt. pl.*, *pro p.* *Rhizocarpon chionophilum*, *Th. Fr. Scand.* *p. 612*.

Alpine and arctic rocks. White Mountains, *Tuckerman*, *Gen.* 1872. Arctic America, *Th. Fr.* in *Journ. Linn. Soc. Lond.*.—The lichen of the White Mountains, which only occurs in the highest region, contrasts conspicuously with the condition of *B. geographica* with which it grows, in the brighter colour of its determinate patches, the flat areoles of which are twice larger, as in the soon protuberant and equally larger fruit. In a plant from the Sierra Nevada, alt. 7000 ft., Cal., *Lapham*, the more scattered areoles are less easily distinguishable, but the prominent, now sessile, often obtusely marginate apothecia contrast sufficiently with the detruded fruit with exceedingly thin margin of *B. geographica* proper. As described, and so far as I have observed, the spores of the European *B. alpicola* are larger than in our plants, which best agree in this respect with the *f. microspora*, *Nyl. Prodr. l. c.*, noted as occurring in Arctic America, by *Dr. Fries* (*Jour. Linn. Soc. Lond. l. c.*)

Parasitic Buelliae. Lichens more or less clearly referable here, and brought together for convenience of reference.

† *Spores bilocular.*

28. *B. saxatilis*, (Schær.) Koerb.; thallus foreign; apothecia minute, sessile, flat, black, the disk opake, with an elevated, persistent margin, the hypothecium brownish-black. Spores ellipsoid, 9-11 by 5-7 mic., the paraphyses at length distinct, with thickened, brown tips.—*Koerb. Syst. p. 228. Anz. Lang. n. 198. Th. Fr. Scand. p. 601. Lecidea, Nyl. Scand. p. 237.*

Upon the thallus of *Bæomyces byssoides*, on talcose schist, Vermont, (*Frost*) Tuckerman *Gen. 1872*. Found but once, and the material before me is small; but no important difference from the European lichen (especially Schær. *Helv.*, n. 240; *Zw. Exs.* n. 140) appears, unless that the paraphyses in ours answer perhaps better, so far as seen, to those of *Lecidea allothallina*, Nyl., *Add. in Flora*, 1881, p. 188 (*Buellia athallina*, (Naeg.) Müll. *Classif. p. 64*) as described; but this last is at any rate very close to Schærer's plant.

29. *B. inquilina*, Tuck.; thallus foreign; apothecia small (0^{mm}, 5-8) soon sessile, a little elevated, flat, brownish-black, the disk rough, the thickish, prominent margin persistent, the hypothecium blackish-brown. Spores ellipsoid, dark-brown, 10-16 by 6-8 mic., the paraphyses finally distinct, brown-headed.—*Lich. Calif. Append. p. 32.*

Upon the thallus of *Pertusariae*. *Pennsylvanica*, *Tuckerman, l. c. 1866*. North Carolina, *Curtis*. South Carolina, *Ravenel*. Texas, *Wright*.—Reaction with iodine deep-blue.—With little doubt the *Calicium stigonellum*, Muhl. *Catal.* a lichen otherwise unknown to us, is to be referred here.

30. *B. scabrosa*, (Ach.) Koerb.; thallus foreign, but the colour of it changed, and commonly to greenish-yellow; apothecia small, soon and for the most part convex, and the thin margin excluded, opake, at length crowded together and confluent, concolorous within, the hypothecium blackish-brown. Spores ellipsoid, 12-15 by 6-8 mic.—*Koerb. Syst. p. 227. Anz. Langob. n. 205. Lecidea, Ach. Meth. p. 48. Nyl. Scand. p. 247.*

On the thallus of *Bæomyces byssoides*, and *B. placophyllus*, and said also to occur 'on the earth and on rocks', in alpine

and arctic regions. Greenland (*Vahl*) Th. Fr. l. c., 1861. Sought in vain in our alpine districts, where the similarly coloured *Lecidea flavo-virescens* is common. The present is called rare in Europe (Nyl., Stizenb.)

31. *B. Trypethelii*, Tuck. *herb.*; thallus foreign; apothecia minute (0^{mm}., 2-4) rounded or often oblong-diform, sessile, flat or a little convex and the thin margin disappearing, opake, the hypothecium blackish-brown. Spores in saccate thekes, oblong-ovoid and constricted at the middle (soleæform) brown, 17 by 8 mic., the paraphyses distinct, jointed, capitulate.

Upon *Trypethelium Carolinianum*, Tuckerm., on bark, Florida, A. H. Curtiss in *herb. Sprague*.—Only a red reaction with iodine observed, and that confined to gravid thekes.

32. *B. minimula*, Tuck. *herb.*; thallus foreign; apothecia exceedingly minute (from less than 0^{mm}., 1, not much surpassing this figure in width) appressed, flat, the thin margin scarcely exceeding the disk, and finally excluded, the hypothecium brown. Spores oblong-ovoid (soleæform) dilutely coloured or colourless, 14-16 by 5-7 mic.—the few paraphyses loose.

On the thallus of a *Pertusaria?* Florida, *Austin*. The reaction with iodine as in the next preceding, of which this may prove to be only a small form.

33. *B. Parmeliarum*, (Sommerf.); thallus foreign, but deformed (more or less) by the parasite, and passing thus into small tufts of commonly cucullate lobules varying also in colour; apothecia minute, convex, immarginate, black, opake, the hypothecium blackish-brown. Spores oblong-ovoid (soleæform) 10-15 by 4-6 mic.—*Lecidea, Sommerf. Suppl. p. 176. Stizenb. Lich. Helv. p. 214. Abrothallus parasiticus, Nyl. Scand. p. 246. A. Smithii, A. Welwitschii, & A. microspermus, Tul. Mem. Lich. pp. 113-115, t. 16, f. 22-26, fide Nyl. A. Smithii, Koerb. Syst. p. 216. Mudd Man. p. 224.*

Upon the thallus of *Parmelia saxatilis*, *P. olivacea*, and other foliaceous lichens. New England, *Tuckerman, Willey*;

&c., not rare. On *P. saxatilis*, Oregon, *Hall*. On *Cetraria Fahlunensis*, Islands of Behring's Straits (but the spores not seen) *Wright*. The plant shows no lichenose reaction with iodine, but is scarcely more abnormal than *Biatora oxyspora* (Tul.) significantly agreeing with the present in its extraordinary action on the matrix, which does.

†† Spores normally 4-locular.

34. *B. parasitica*, (Fl.) Th. Fr.; thallus foreign; apothecia minute, sessile, flat, or at length a little convex, naked, with a regular, thin margin, the hypothecium blackish-brown. Spores ellipsoid and oblong, 4-locular, 9-18 by 3-6 mic.—*Lecidea*, Nyl. *Prodr.* p. 144; *Lich. Par.* n. 68. *Dactylospora*, Koerb. *Syst.* p. 271.

On the thallus and apothecia of *Lecanora pallescens*, and *Pertusaria* sp., California (*Bolander*) Tuckerman *Gen.* 1872. Oregon, *Hall*.—This is the type of a number of minute apothecia, varying a little from it, which are now (not wholly without hesitation) separated specifically by writers on the arctic *Flora*. Several of these are reckoned below.

35. *B. urceolata*, Th. Fr.; "thallus foreign; apothecia minute, the disk at first deeply urceolate ('oftener gyalectoid,' Nyl.) then concave, with a prominent, thickish, somewhat constricted margin, black, naked, blackish or black within, the hypothecium brownish-black. Spores narrow-oblong, obtuse, normally 4-locular (but now occurring also 5-8-locular) 14-18 by 4-6 mic.;" Th. Fr. *l. infra c.*; "Spores 15-23 by 5-6 mic., the paraphyses not distinct," Nyl. *infra c.*—Th. Fr. *Lich. Arct.* p. 234. *Lecidea sociella*, Nyl. *Lapp. Or.* p. 165.

Upon the thallus of various lichens, Greenland (*Vahl*) Th. Fr. *l. c.* 1861.—From this species, *L. attendenda*, Nyl., *l. c. p.* 186, an inhabitant of the thallus of *Pilophorus cereolus*, *v. Fibula* (but not yet observed here) is said to differ in a less dark hypothecium, and slightly smaller spores, which also become more than 4-locular. And from this is separated an "exceedingly close-related" *L. parasitula*, Nyl. *l. c.*, found on *Pilophorus cereolus*, *v. robustus*, in islands of

Behring's Straits, *Wright*, by yet smaller and ellipsoid spores, 9-14 by 5-6 mic., but reason scarcely appears for distinguishing this from the *B. parasitica* of the west coast.

36. *B. glaucomaria*, (Nyl.) ; "thallus foreign ; apothecia superficial, small, flat, with thickish, somewhat rugulose margin, black within, now heaped, the hypothecium brownish-black. Spores oblong-ovoid, 4-locular, from colourless at length brown, 21-25 by 8-9 mic."—*Lecidea*, Nyl. *Scand.* p. 245.

On the thallus of *Lecanora glaucoma*, Greenland, *Stizenberger Index Hyperb.* 1876.—Small, flat, black apothecia, the thickish persistent margin of which is strongly rugulose, have occurred here on *Lecanora tartarea* (New Bedford, *nom. Buellia glaucomariooides*, Willey *herb.*) and should agree closely with the present species (as described) except that the more ellipsoid spores hardly exceed 12-16 by 5-7 mic.

37. *B. Pertusaricola*, Willey, *herb.* ; thallus foreign ; apothecia minute (scarcely reaching 0^{mm.}, 5 in width) innate and adnate, concave, the thick margin persistent, the hypothecium blackish-brown. Spores 30-50 in the thekes, 2-4-locular, brown, 5-7 $\frac{1}{2}$ by 2 $\frac{1}{2}$ mic. ; the paraphyses distinct at length, incrassated and brown above.

On the thallus of *Pertusaria communis, saxicola*, Weymouth and New Bedford, Mass., Willey.

Tribe III.—G R A P H I D A C E I , Eschw., Nyl.

Apothecia difform, normally oblong or lengthwise extended (lirellæform) but reverting also to rounded, bordered by a proper exciple, which is crowned in some large groups by an accessory thalline one, or, in others, disappears.

We reach, in *Graphidacei*, the division, in our view of lichenose vegetation, where thalline features, except now in extraordinary relation to the apothecium, are least conspicuous. No lobed, or, still less, branched conditions signalize this tribe; and, in a large proportion of species, the thallus is so far reduced as to appear often deficient. The type is then, with all its luxuriance of apothecial development, a degraded one; but it attains, at the same time, to an unexpected distinction in its gonomous system, which, not wholly without exception (namely the very few species of *Opegrapha* of the elder lichenographers now brought together in *Lithographa*, Nyl. in Leight. Lich. Brit. p. 360, and the more distinct *Xylographa*, Fr.) and with whatever difficulty satisfactorily definable, exhibits itself in neck-lace-like-connected series of cells largely also distinguishable in colour, suggesting the structure of the Alga *Chroolepus*, Ag. We are here however considering Lichens from the point of view of their fruit-characters; and are precluded, too, from laying hastily stress on the peculiarities of Graphidaceous gonidia by the fact that similar gonidial structure is known to occur in Lecanoreine groups (*Gyalecta lutea*, &c., = *Biatorinopsis*, Mull., but the structure in question is certainly not confined to the *lutea*-group of *Gyalecta*, and is still but imperfectly determined) where it is difficult to hesitate rather to subordinate it, than force the plants showing it into a wholly unnatural association with *Graphis*.

The tribe (upon which the observations in the writer's *Genera*, p. 192, may be compared) — only sparingly represented in the temperate regions of the earth — finds its type and real explanation in the central family *Opegraphaei*; and there in the vast tropical genus *Graphis*, for the illustration of which we owe almost everything to Nylander; and the other Families conveniently (at least in the present condition of knowledge) group themselves on either side. But the North American Flora includes tropical regions, and even the United States Flora sub-tropical; and we thus have already some, and may look for many more, unfamiliar natives of the hot countries to illustrate our northern representatives of the Graphidaceous type, and condition our estimates of it. The systematic presentation of these sub-tropical *Graphidacei* is made however exceedingly difficult by the still imperfect state of our knowledge concerning them: a remark which holds good not merely of our United States lichens, but also of those of the West Indies, and of Equatorial America, upon which the illustrious European lichenographer last-named has thrown already such abundant light.

Fam. I. — XYLOGRAPHÆI.

The lichen grows in the matrix hypophloious and only exceptionally exserts the gemmiferous system consisting of bright-green ordinary gemmae. Apothecia few, more or less rounded with thin, commonly brown, and thickish, pale, and hair-bearing. The family is represented here in the genus *Xylographa* and *Xylographa*.

LII.—AGYRIUM, (Fr.) Nyl.

Apothecia more or less rounded becoming oblong; softish; reddish. Spores ellipsoid, simple, decolorate, or reddish. Thallus hypophlaeous.—This type, and *Xylographa*, were reckoned among Discomycetes by Fries, who did not even place them together (*Summ. Veg. Scand.*) but Coemans, than whom no one has done so much to explain both, has no difficulty in allowing (*l. infra cit.*) a close affinity between them, in which lichenologists generally appear to be agreed; only Dr. Th. Fries (*Lich. Scand.*, p. 634) dissenting, and rejecting *Agyrium* to *Fungi*.

1. *A. rufum*, (Pers.) Fr.; thallus indicated more or less by a pale spot; apothecia (0, 2-7 millim. wide) innate-sessile, from flattish, when a paler margin is sometimes indicated, soon convex and immarginate; bright to dark (commonly rusty) rufous and blackening. Spores 10-18 by 6-8 mic., the paraphyses indistinct.—*Fr. Syst. Myc.*, 2, p. 232. *Nyl. Prodr.* p. 148; *Scand.* p. 250. *Coem. Not.* p. 19. *Tuckerm. Gen.* p. 225. *Minks, Morph. Stud. in Flora*, 1880, p. 34. *Wainio Adjuv.*, 2, p. 147. *Stictis*, Pers.

On dead wood, as on stems of *Osmunda*, New Bedford, (*Willey*) Tuckerman, *l. c.* 1872. Elsewhere in New England, not rare, *Willey*. Texas, *E. Hall*. Washington Territory, *Suksdorf*.—Reaction of the hymenium with iodine, blue.—The plant is commonly placed here by lichenologists; Dr. Th. Fries dissenting (*Lich. Scand.*) and rejecting it to *Fungi*.

2. *A. carneolum*, Tuckerm. *in litt.*; thallus hypophlaeous; apothecia (of the size of those of 1) appressed; from a little concave becoming flat; ovoid-ellipsoid; pale-fleshcoloured, and brownish. Spores rounded and ellipsoid; the larger ones 6-13 by 6-11 mic.; the paraphyses indistinct.

On dead wood, Washington Territory, *Suksdorf*. Only a single specimen seen, but the lichen appearing well-distinguished.

L I I I . — X Y L O G R A P H A , F r .

Apothecia angulate-patellæform passing into lirellæ-form ; the exciple softish ; and more or less, at least originally, pale. Spores ellipsoid ; simple ; decolorate. Spermatia acicular, on simple sterigmas. Thallus as above.

Recedent from the Tribe in the gonidia, but belonging to it by its fruit-character ; and the lichens referred here cannot naturally be looked for anywhere else in the Class.

1. *X. parallela*, (Ach.) Fr. ; thallus hypophlæous ; apothecia innate (surpassing 0^{mm.}, 5 in length, and 0^{mm.}, 2 in width) lanceolate and linear, acuminate ; disposed parallelly ; the thin, elevated margin finally disappearing, and leaving a flat disk, black (now brown) the hypothecium without colour, as in the other species. Spores ellipsoid, 10-16 by 5-7 mic., the slender paraphyses at length distinct. — *Coem. Not. p. 16.* *Nyl. Scand. p. 250;* & in *Fellm. Lich. Fenn. n. 205.* *Th. Fr. Scand. p. 638.* *Minks in Flora, 1880, p. 42.* *Wainio Adjuv., 2, p. 147.* *Opegrapha, Ach. Hysterium, Wahl. Stictis, Cord.*

On dead wood. Mountains of New Hampshire (*Willey*) Tuckerman, *Gen. 1872.* Maine, *Pringle.* New York, *Willey.* Washington Territory, *Suksdorf.* British Columbia (the spores in an otherwise well-marked state, now smaller, 8-11 by 3-4) *Macoun.* — Acharius (*L. U.*, p. 253) notes the European lichen as more often exhibiting an external, though thin, thallus ; and Dr. Th. Fries (*l. c.*) finds now a sufficiently distinct, and even verrucose thalline crust.

2. *X. disseminata*, Willey ; thallus of minute, round, scattered or at length crowded, smooth granules, glaucescent ; apothecia superficial (from 0^{mm.}, 2 reaching 0^{mm.}, 4 in length, and 0^{mm.}, 3 in width) rounded, elliptical, and oblong, often blunt-angled ; concave ; the obtuse, wavy margin at length thinning out, leaving the disk flattish ; soon and commonly black. Spores oblong ; nebulous as in all the species, but passing here from pseudo-2 to pseudo-4-locular ; 14-26 by

4-6 mic., the sparse capillary paraphyses rather loose. Spermatia staff-shaped, 16-24 mic. long, straight.—*Willey MS.*

On bark and roots of White Cedar (*Cupressus Thyoides*) and also on old rails and shingles, New Bedford, Mass., *Willey*. Dead wood, Mt. Desert, Me., *the same*.—Reaction of the hymenium with iodine dark-blue.

3. *X. hians*, Tuckerm. in *herb.*; thallus hypophlaeous; apothecia (0^{mm}., 3-5 long) superficial; from rounded and boat-shaped, when wide-mouthed and gaping, also narrowed and lirelliform, and at length angulate and sub-stellate; with a thin incurved margin; crowded at length into dense clusters; from pale-brown passing into livid-black. Spores rounded and ovoid; 8-12 by 5-7 mic.; in napiform thekes; amid capillary, and rather lax paraphyses.

On dead wood, Washington Territory, *Suksdorf* in *herb.* *Sprague*.—Reaction of the hymenium with iodine blue.

4. *X. Opegraphella*, Nyl.; thallus rugose-verrucose becoming at length somewhat turgid, glauecent passing into pale-brownish, and now obsolescent; apothecia minute (0^{mm}., 1-3 wide) superficial; concave; from rounded soon angulate and lirellate, and at length bi-tri-furcate; pale to dark-brown. Spores ellipsoid and oblong-ellipsoid, 11-15 by 3-5 mic.—*Nyl. Enum. Gen. p. 128.* *Tuckerm. Gen. p. 202.* *Opegrapha stictica*, *Fr. & Tuck. in Tuckerm. Lich. exs. n. 97, non Nyl.*

On dead wood of the coast of Massachusetts and Maine, *Tuckerman*, *l. c.*, 1855. Grand Manan, N. B., *Willey*. Gaspé coast, Canada, *Macoun*.

F a m . 2 . — L E C A N A C T I D E I .

Thallus distinct, uniform, from scurfy becoming compacted, or tartareous, and now mealy, the gonimous system constituted of more or less reddish-yellow gonidia which are linked together in branching series; apothecia

rounded more or less, but passing also into oblong, and even lirellæform; pale and blackening; marginate.—The two genera here brought together suggest now Lecideine, and now Lecanoreine affinities, and have found such various disposition. It is however anything but natural to assign *Lecanactis illecebrosa* to one Tribe, and *L. lyncea* to another; and the gonomous system, in these species, as in *L. abietina*, and in *L. premnea*, is accordant; and is that so peculiarly characteristic of *Graphidacei*.

LIV.—LECANACTIS, (Eschw.) Koerb., emend.

Apothecia rounded, or, more rarely, oblong; the (proper) exciple wholly black. Spores finger-shaped, and fusiform-oblong; quadri-pluri-locular, without colour. Spermatia oblong, and staff-shaped; on simple sterigmas. Thallus as above. (Tuckerm. *Obs. Lich.* 3, *l. c.* 6, p. 283.)

1. *L. abietina*, (Ach.) Koerb; thallus effuse, thin; compact and smoothish at length chinky, as also powdery and thickened, glaucescent; apothecia middling-sized to almost ample, rounded or at length angulate-diform, sessile, the soon convex disk, and, more or less, the tumid margin densely white or pale-buff-pruinose, black within. Spores fusiform-oblong, 4-plurilocular, without colour, 30-40 by 4-6 mic. Spermogones wart-like; spermatia very large, oblong, 11-16 by 3-4 mic.—Koerb. *Syst. p. 276. Lecidea, Ach. Nyl. Prodr. p. 138; Scand. p. 241.*

Trunks. Arctic America, between lat. 54° and 64° N. (Richardson) Hooker, *l. c.*, 1823. On *Abies*, California, Bolander.

2. *L. premnea*, (Ach.) Tuckerm.; thallus thin, contiguous, smoothish now granulate, or rugose and rimulose, glaucescent, ash-coloured, or greenish, more or less limited, or otherwise conditioned, by the blackening hypothallus, or

obsolescent; apothecia middling-sized to almost ample, rounded, or at length flexuous-diform, sessile, flat, black, the disk green-pruinose, becoming naked, white within, the obtuse margin minutely cross-striate, or cleft, the hypothecium black. Spores fusiform-oblong, 4-plurilocular, without colour, 15-23 by 3-6 mic. Spermogones, and spermatia minute. — *Tuckerm. l. c. Lecidea, Ach. L. U.*, p. 173, 670. *Nyl. Prodr.* p. 138; *Lich. Paris*, n. 67; *Scand.* p. 240. *Schismatomma*, *Mudd Man.* p. 222.

b, *chloroconia*, Tuck. ; margin of apothecium thin. Spores dactyloid, 4-locular, 11-17 by 3-5. — *Tuckerm. Gen.* p. 194. *L. chloroconia*, *Ejusd. Obs. Lich. l. supra c.*

On bark of Cypress, Louisiana (*Hale*) *Tuckerman Gen.* 1872. Pine, and other bark, California, *Bolander*. South Carolina, *Eckfeldt*. Alabama (on sandstone) *Peters*. — b, on Maple, and Chestnut, New Hampshire, and Massachusetts, *Tuckerman*; and Vermont, *Frost*. On Hemlock spruce, and wood of dead Larch, New York, *Willey*; *Miss Wilson*. On Pine bark, Manitoba, *Macoun*. — The finest conditions of this specific type are found in the tropics; and the writer has sought to consider them at the place first-cited.

— The spores of our more northern forms of *a* appear to be rather smaller than in the European lichen; and little therefore to be left to keep the var. *b* apart.

3. *L. Californica*, Tuck. *in litt.*; thallus tartareous, rimose becoming rugose-verrucose and smooth, glaucous; apothecia middling-sized to ample, adnate, rounded and angulate, dilated, passing into oblong with rounded ends; disk flat, at length convex, grey-pruinose, the thin rugulose margin, and the hypothecium black. Spores oblong, always 4-locular, 20-26 by 4-6 mic., in 6" and 8", in cylindraceous-clavate thekes, amid capillary, flexuous, branched paraphyses.

Upon twigs in Lower California, *L. Belding*. — Nearest to *L. lyncea* of Western Europe, which exhibits a mealy thallus, smaller apothecia with all the constituents of the hymenium more slender, and long-fusiform or acicular, plurilocular spores.

L V. — PLATYGRAPHA, Nyl.

Apothecia rounded, oblong, or, more rarely, lirellæ-form-extended, the proper exciple, the margin of which is now obscure, or obsolete, variously coloured, and crowned by an accessory thalline one. Spores oblong passing into fusiform, 4-plurilocular, without colour. Spermatia oblong, staff-shaped, or needle-shaped, on simple sterigmas. Thallus as above.—A conspicuous tropical type, represented in our northern States by only one reduced expression.

1. *P. vernans*, Tuckerm. herb. ; thallus of minute, crowded and heaped, and more or less at length coalescent granules, grayish-green ; apothecia small (0^{mm}., 4-8 wide) rounded, sessile becoming adnate, the disk from pale-brown at length black, soon tumid, and excluding the thin, white, flexuous margin ; the hypothecium brownish-black. Spores from ellipsoid soon dactyloid, 4-locular, the distinct paraphyses finally rather lax.

On charred wood, Florida, *A. II. Curtiss*, in herb. Sprague.—As in some other species, the peculiar gonidia of *Graphidacei* are not well exhibited in this, which yet is, perhaps, better placed here than in *Biatora*, to which, *in litt.*, I at first referred it.

2. *P. Californica*, (Tuck.) Nyl. ; thallus sub-tartareous, rugose-verruculose, whitish, and ashcoloured ; apothecia middling-sized (1^{mm}.-1^{mm}., 5, in width) sessile, rounded and angulose ; the slightly convex, black, ashy-pruinose disk bordered by a thickish, flexuous-sub-crenate, white margin ; the hypothecium black. Spores fingershaped, 4-locular, 16-18 by 3-4 mic., without colour, amid filiform, lax paraphyses. —Nyl. *Syn. N. Caled.*, p. 58, note. *Tuckerm. Gen.*, p. 195. *Dirina*, Tuck. *Calif.*, p. 17.

On bark of *Quercus agrifolia*, and *Pinus insignis*, California, (*Bolander*) Tuckerman *l. c.*, 1866.

3. *P. ocellata*, Nyl. ; thallus now thin but thickening also and sub-tartareous, granulate, soon compacted and rimose,

smooth, more or less bordered and decussated by a blackening hypothallus; apothecia small to minute ($0^{\text{mm.}}$, 3-5 wide) rounded (also now oblong) the disk flat, from livid-pale blackening, white-margined more or less distinctly by the thallus which is elevated at length to constitute a prominent, lecanoroid, sub-entire or crenate, accessory receptacle; the hypothecium brownish-black. Spores fusiform, 4-locular, 14-20 by 3-5 mic., without colour, the slender paraphyses soon distinct.—*Nyl. in Prodr. N. Gran.*, p. 94; & in *Lindig Exs. n. 788. Lecanactis Punctillum*, Tuckerm. in *litt. olim.*

On *Berchemia*, and on Beech; low country of South Carolina (*Ravenel*) Tuckerman *Gen.*, 1872.

4. *P. periclea*, (Ach.) Nyl.; thallus of minute, scurfy granules collected into scattered heaps, or now at last contiguous and rimulose passing into verruculose, whitish; apothecia small, depressed, rounded and oblong, at length somewhat furcate; the disk flat soon convex, brownish-black, and black, sub-sebrous, with an obscure and evanescent proper margin, which is bordered by a coarse, white thalline one, itself now disappearing, concolorous within. Spores acicular, 4-locular, 30-36 by 3-4 mic.—*Nyl. Scand. p. 256. Anz. Lich. Ital. Sup. n. 325. Schismatomma dolosum, Koerb. Syst. p. 256, & herb.*

On Hemlock bark, Southern Massachusetts, and in the New Hampshire Mountains, *Willey*.

5. *P. interrupta*, (Fée) Nyl.; thallus thin, sub-tartareous, compact, white; apothecia minute, from rounded soon angulate ($0^{\text{mm.}}$, 2-4 wide) and oblong, and bi-tri-furcate, and at length much narrowed and slender-lirellæform (reaching $1^{\text{mm.}}$, long.) Spores dactyloid, 4-5-locular, 16-20 by 5-6 mic., without colour.—*Nyl. in Prodr. N. Gran. p. 95; & in Lindig exs. nn. 783, 814. Graphis, Fée Ess., p. 41; Suppl. p. 30; & Chiodecton monostichum, Ejusd. Suppl. p. 54; omn. sec. Nyl.*

Upon bark, in equinoctial America, Fée; Nyl. and represented so closely by a lichen from Southern Florida (*Austin*)

that I cannot omit the reference, though the single specimen is too small and incomplete. The plant resembles equally *P. leptographa*, Nyl. *l. c.*; and this might, as he says, be readily taken for the other; but the spores of ours, though perhaps more commonly 5-locular, appear to be smaller, and without a halo.

6. *P. Ravenelii*, Tuckerm.; thallus thin, from scurfy at length sub-tartareous, rimose, and granulate, cinerascent; apothecia middling-sized, sessile, roundish soon flexuously stellate-lobate (about 1mm. wide) and, yet more commonly, lirellæform-extended, tortuous, and furcate, obtuse, the dilated disk chocolate-brownish, and white-pruinose, the stout, erect proper margin crowned at first by a dense, white powdery one of the thallus, which disappears, and the denudated excipie blackens; the hypothecium black. Spores fusiform, 4-locular, 25-40 by 5-6 mic., without colour.—*Gen. Lich. p. 196.*

On various barks, Corpus Christi, Texas (*Ravenel*) Tuckerman, *l. c.*, 1872.

Fam. 3.—O P E G R A P H E I.

Thallus uniform, and either hypophlæous, or exposed, continuing thin and hard (cartilagineous) or becoming thickened and softish (tartareous) the gonomous system (with very rare exceptions,) as in *Lecanactidei*. Apothecia normally lirellæform.

L V I . — E N T E R O G R A P H A , Féé.

Apothecia from punctiform passing into lirellæform, inmersed, softish, pale and blackening, inmarginate, pale within. Spores from dactyloid fusiform, and acicular, quadri-plurilocular, without colour. Spermatia oblong, on simple sterigmas. Thallus well-developed, sub-cartilagineous.—A much-mistaken, small group

of lichens, of which the Tribe has not always seemed clear. The typical species approach yet very near to some types of *Graphis*; but differ essentially in their immarginate, immersed apothecia, and in the spores. One European species may be readily taken for *Chiodecton*.

E. elegans, (Eschw.) thallus thickish, sub-cartilagineous, smooth, granulate, greenish-glaucous; apothecia elongated, very narrow, and excessively spread-branched, from pale blackening. Spores from ellipsoid dactyloid, 4-locular, 14-16 by 4-6 mic., without colour.—*Sclerophyton*, Eschw. *Syst.*, p. 14, fig. 8; *Lich. Bras.*, p. 101. *Stigmatidium*, Nyl. *Syn. N. Caled.*, p. 58.

Upon bark, low country of Georgia, *Ravenel*. Florida, *Austin*.

L V I I . — G R A P H I S , A c h . , N y l .

Apothecia lirellæform, and, more or less, for the most part, branching, reverting rarely to rounded-diform, mostly innate, the proper exciple coloured, or black, the base more often colourless, crowned almost always, more or less, by an accessory one of the thallus. Spores from ellipsoid typically oblong, and erucæform, 4-pluri-locular, reaching also, in many species, muriform-multi-locular, brownish, and decolorate. Spermatia oblong, and staffshaped, on simple sterigmas. Thallus crustaceous, uniform.—The author has considered the subdivisions of this vast genus in *Genera Lichenum*, p. 202. It is however preferred here to consider the section *Fissurina* as occupying an analogous place, on the one side, looking towards *Enterographa*, of the great central group *Leucogramma*, into which it clearly passes, as does *G. scripta* and its allies, as evidently looking towards *Opegrapha*, on the other. Nylander, above all others, has exhibited to us the exuberance of *Graphis*

as well by description as by the determination of such collections as Lindig's and Wright's; but the history of the genus throughout the warmer regions of the earth is still very far from completeness, while in Mexico, and especially in the extreme southern portions of the United States, it is hardly beginning to be known.

* *Fissurina*. *Apothecia thin, simple, or variously somewhat branched, immersed, resembling small, more or less at length gaping fissures, defined finally by the elevation of the thalline edges of these fissures, the proper exciple pale.* (Genus *Fissurina*, Fée., Mont. Genus *Diorygma*, Eschw., Müll. Arg. *Graphis sect.*, Mey. Nyl. in *Prodr. N. Gran.* p. 86.)—Whether *Diorygma*, Eschw. *Syst.*, 1824, or *Fissurina*, Fée, of the same year, both based on the same conception, have the priority, is uncertain, and appears so even to Fée (*Suppl.* p. 2) but, notwithstanding the indisputably greater value of the analyses of the German author as compared with those of the French, the thought of the latter is perhaps the purest, and has found readier recognition with later lichenists. The type is an extreme degeneration of the next following, great tropical group *Leucogramma*, turning especially on the diminution and final disappearance of the proper margin. But Eschweiler recognized also *Graphis grammatis*, Fée, as a member of his *Diorygma*, and has been followed therein by Montagne; and that species should carry with it others, as *G. contexta* (Pers.) Nyl., *G. Babisii*, Fée, *G. Lauteriana*, Fée, all of them referred to the present section by Krempelhuber to the disadvantage of the section, which thus disappears in *Leucogramma*. The named species are then excluded in the view here taken, and, for the same reason, *Fissurina Babingtonii*, Mont., which, closely enough related, as he saw, to the next section, appeared yet, in his specimens, to be differenced by the deficiency of the proper margin, proves now, in

other specimens (Wright *Lich. Cub.*, 2, 376, 396, both of them by the spore-characters, *G. instabilis*, Nyl. in *Prodr. N. Gran.* p. 86, n., but published now as the scarcely otherwise differing *G. Babingtonii*) to display sufficiently this margin, and is also here referred to the section *Leucogramma*. Thus restricted, *Fissurina* may be said to be typified by *Graphis nitida* (Mont. !) Nyl. ! The little group of humble lichens of this affinity, is however embarrassed, as well by the general reduction of structure — the thalline edges of the clefts playing the part even of apothecial margins — as by the feeble development of the inner structure, and the difficulty of finding spores ; and I can say no more of what follows, than that it brings together the best results I have been able to reach. There is no reason why other of the tropical forms should not turn up in our extreme Southern districts ; and it is quite certain that this section of *Graphis* will one day be understood here better than it is now.

1. *G. nitida*, (Mont. & V. d. Bosch.) Nyl. ; thallus membranaceous-cartilagineous, pale-olivaceous, smooth and bright ; apothecia from sub-simple and flexuous soon elongated, furcate-ramose, and approximated in radiating groups ; the pale disk concealed by the more or less gaping thalline margin. Spores [in Hawaiian specimens entirely agreeing with Montagne's from Java, more or less cocciform-ellipsoid, 4-locular, the cells entire, 12-15 by 9-11 mic., without colour.] — *Fissurina*, Mont. & V. d. B. *Lich. Jav.* p. 51 ; *Syll.*, p. 355. *Graphis*, Nyl. *Enum. Gen.* p. 130.

Trees in tropical and sub-tropical regions. South Carolina, *Ravenel*. Lower Alabama, *Beaumont*. But the spores not seen in our plants. Eschweiler's *Diorygma nitidum* is scarcely to be satisfactorily understood by the description ; but Montagne's lichen is known, and has been accepted by Nylander.

2. *G. radiata*, (Mont.) Nyl. ; thallus as in the last ; apo-

thecia simple, or 2-3-furcate in radiating groups, the margins erect-connivent (Mont. ; Nyl.) Spores (in Lindig's specimen) ovoid, 4-locular, the cells entire, 12-16 by 5-8 mic. — *Fissurina*, Mont. Syll. p. 354. *Graphis*, Nyl. in Prodr. N. Gran., p. 86; & in Lindig herb. N. G. n. 793.

Trees, coast of Texas? Wholly uncertain; but perhaps as likely to occur as the preceding, from which it is considered to differ in species by the authors cited, although neither their descriptions nor the cited specimen seems quite enough to make the difference clear. Spores commonly ovoid; but cocciform ones also occur. It is not without interest that a sub-muriform character is rarely exhibited.

3. *G. botryosa*, Tuckerm. *herb.*; thallus as in the preceding, smooth and bright, pale-olivaceous; apothecia small, ellipsoid and oblong, simple, soon gaping, white, more or less densely aggregated in at length anastomosing clusters; the disk colourless. Spores oblong, 4-locular, the cells entire, 14-20 by 4 mic., without colour, invested with a halo.

Trees, southern Florida, *Austin*. And what appears the same was found in northern Florida, as possibly also South Carolina, by *Ravenel*; and in Cuba by *Wright*; but spores seen in neither of the last.

4. *G. Dumastii*, (Fée) Nyl.; thallus as in the preceding; apothecia from ellipsoid becoming 2-3-angular, and oblong, simple, soon open and dilated, the thalline margin sharp. Spores in cylindraceous thekes, oblong-ellipsoid, 4-locular, the cells entire, 14-18 by 5-7 mic., without colour (Fée, Nyl.) — *Fissurina*, Fée Ess., p. 59, t. 16, f. 4; Suppl. p. 46. *Graphis*, Nyl. in Prodr. N. Gran. p. 86; *Syn. N. Caled.* p. 80.

On bark of Cinchona, Tropical America, *Fée*. Florida? The specimens insufficient; but possibly indicating this species, which may well occur.

5. *G. leuconeephala*, Nyl.; thallus as in the preceding; apothecia indicated by narrow flexuous fissures in white, opaque, rather prominent and conspicuous spots; the disk colourless.

Spores ellipsoid, muriform-multilocular, 14-28 by 8-14 mic., finally without colour, invested more or less with a halo.—*Nyl. Lich. Kurz. Bengal. in Flora, 1869, p. 73; & in Wright Lich. Cub. 2, n. 73.*

Trees, Southern Texas, *E. Hall.* Southern Florida, *Austin.* Spores now brownish in the thekes.

6. *G. nitidescens*, Nyl.; thallus much as in the species preceding; apothecia from rounded, and ellipsoid, soon oblong, simple, rather prominent, more or less white-veiled, the cleft at length gaping, the disk pale. Spores ovoid-oblong, 4-6-locular, sub-muriform, the middle cells being more or less divided, 16-20 by 4-8 mic., without colour.—*Nyl. in Wright Lich. Cub., 2, n. 68.*

Trees, Florida, *Ravenel.* *A. H. Curtiss.*—I have seen no description of this marked species.

7. *G. Columbina*, Tuckerm. *herb.*; thallus much as in the last; apothecia slender, soon elongated, flexuous, and furcate-ramose running together into loose groups, the rounded margins white within, the disk narrowed. Spores ellipsoid, and oblong, muriform (ser. transv. c. 5-8, long. c. 4) 14-30 by 10-12 mic., fuscous.

Trees, Southern Alabama (Pigeon Creek) *Beaumont.* Near to, and perhaps not distinct from the last preceding, but appearing to differ as above. The other is considered by Nylander to be represented also (with a *videtur*) by Wright, *Cub. n. 69*; but this is less comparable with our plant, than what seems the typical *G. nitidescens* (Wright, *n. 68.*)

8. *G. subnitidula*, Nyl.; thallus as in the preceding; apothecia minute, sunken, from ellipsoid soon elongated, flexuous, and somewhat branched, and now collected in radiating groups, the very narrow exciple more or less conspicuously brown-edged, the cleft exceedingly thin. Spores oblong-ellipsoid, sub-muriform (ser. tr. 8-10, long. 1-2) 20-24 by 6-8 mic., finally colourless.—*Nyl. in Wright Lich. Cub. 2, n. 155.*

Trees, Southern Florida, *Austin.* Well agreeing with the

Cuban lichen, except that in the latter the spores seen shew only entire spore-cells.

9. *G. glaucoderma*, Nyl.; thallus thickish, incrusting, smooth, and more or less bright, greenish-glaucous; apothecia indicated by narrow, much elongated, flexuous, branched clefts, aggregated commonly in radiating groups, and soon irregularly gaping, or finally much dilated, and stellate-angulate, the flat disk flesh-coloured. Spores ellipsoid, sub-muriform (ser. tr. 4-5, the cells more or less divided) 15-20 by 7-10 mic., without colour. — *Nyl. in Wright Lich. Cub. 2, n. 61.*

Trees, in Southern Georgia, and Northern Florida, *Ravenel*. Southern Florida, *J. Donnell Smith*. This, and the immediately preceding species have not, to my knowledge, been described. — *G. subnitens*, Nyl. *l. c. n. 70*, without description, is exceedingly like the present, but its possibly smaller spores are brownish, and invested with a halo.

10. *G. Beaumontii*, Tuckerm. *herb.*; thallus thickish, granulate-uneven, somewhat shining, greenish-glaucous; apothecia stout, innate-superficial, ellipsoid, and oblong, simple, a turgid thalline margin much concealing the disk, which is at length open, and the cleft even gaping, the pale proper margin obscure. Spores cocciform, 4-locular, the spore-cells entire, 12-20 by 8-14 mic., for the most part without colour. — *G. Babingtonii*, Tuckerm. *Gen.*, p. 211, *not of Nyl.*

Trees, Southern Alabama, (*W. J. B. Beaumont*) Tucker-*man*, *l. c.*, 1872. Low country of South Carolina, *Ravenel*. Texas (low country) *E. Hall*. Answering generally to the description of *Fissurina Babingtonii*, Mont. *Syll.*, p. 354; but this, as recognized by Nylander (*Wright. Cub. 2, n. 37, a, b, 39, b*) is a distinct lichen referable perhaps rather to the next succeeding section of the genus, and has not occurred here.

* * *Leucogramma*. *Apothecia typically robust, simple, passing into elongated, flexuous, and at length many-branched forms, innate, becoming readily prominent, the less-marked proper margin connate more or less with the mostly conspicuous*

(whitish) thalline one; the disk pale, now blackening. (Genus *Leucogramma*, Mey. *Entwick.* Genus *Leiorrhema* pr. p. Eschw. *Syst.* Genus *Leiogramma* pr. p. Eschw. *Bras. Graphis*, sect. *Frumentarie*, Nyl. *Enum. Gén.*, & in *Prod. N. Gran.* p. 81.)—It is only at the extreme south, that this tropical group—the centre and type of *Graphis*—enters our Flora. And, in this Tribe at least, the Lichen-Flora of the regions where it makes its appearance is still so imperfectly known, that it may be long before our species are understood. In what follows the best is sought to be done with the small material in hand, so far as this is sufficient for any attempt at judgment.

11. *G. rufula*, Mont. ; thallus thin, smooth, pale to dark-olivaceous-greenish, and cinerascent, more or less black-limited; apothecia scattered, innate-emergent and prominent, stout, oblong soon much elongated, and flexuous, but continuing for the most part simple, disk closed, the reddish becoming at length dark proper exciple incrassated and finally lengthwise striate, the thalline one inconspicuous. Spores ovoid-ellipsoid, 4-locular, colourless, 14-18 mic. long, 6-10 mic. wide.—*Crypt. Guyan.* n. 132; *Syll. p. 346.* Nyl. in *Wright Lich. Cub.* 2, n. 10.

Trees, Florida, *Austin.*

12. *G. scolecitis*, Tuckerm. ; thallus very thin, smooth, greenish-ashcoloured, more or less decussated and limited with black lines; apothecia scattered, slender, innate, elongated and flexuous, acute, from simple at length furcate and somewhat radiate, the disk concealed, the striate margin of the brown exciple closely enveloped by the thalline one. Spores broad-ellipsoid, 4-7-locular, two of the cells commonly passing into four (sub-muriform) 14-23 mic. long, 7-9 mic. wide.—*Gen. Lich. p. 210, note.*

Southern Alabama, *Beaumont.* Florida, *Miss Wilson.*—Apothecia commonly quite innate, with the aspect of species of the first section; but finally assuming the habit rather of the species immediately preceding.—Spores not seldom invested with a halo.

13. *G. Floridana*, Tuck. in herb. ; thallus smooth, glaucous; apothecia densely crowded, and for the most part concealing the thallus, coarse, emergent, straight and greatly elongated, and also shorter and variously flexuous, simple or sparingly at length branched, the closed margins of the pale proper excipie white-powdery, but the disk at length more or less open, and now blackening, the thalline margin tumid, rounded. Spores ellipsoid, 4-locular, colourless, 10-14 mic. long, 7-9 mic. wide.

Trunks; Florida, *Austin*. With much the aspect of Wright *Cub.*, c, the spores of which are unknown, but which Nylander has referred, with a *videtur*, to *G. chlorocarpa*, Fée; but evidently best associative with *G. grammatis*, Fée, Nyl., now closely resembling the other externally (Wright *Cub.*)

14. *G. Mosquitensis*, Tuckerm. *in litt.* ; thallus thin, from scurfy more or less compacted, but remaining uneven, and dull, glaucous; apothecia small, scattered, immersed and emergent, oblong at length elongated, flexuous, simple, the proper margin blackening above, the concolorous disk at length naked, and open. Spores erucæform, delicate, 10-26-locular, the cells entire, 20-26 mic. long, 5-7 mic. wide, without colour.

Mosquito inlet, Florida, *Herb. Sprague*. Also at St. Augustine, *the same*.—This and the next two following are closely akin, but possibly distinguishable; their rank to be determined when we know more of them.

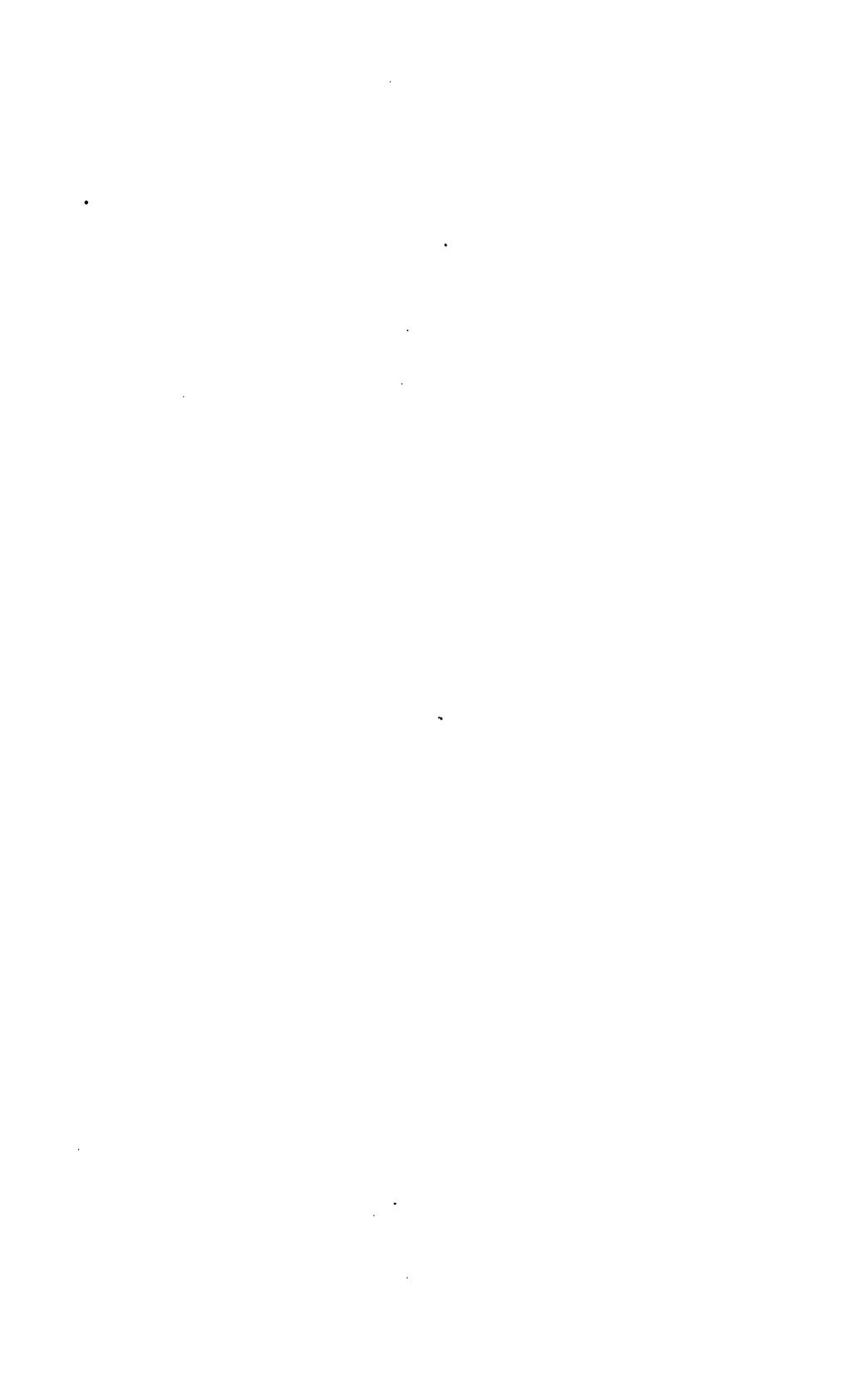
15. *G. leucopepla*, Tuckerm. *herb.* ; thallus as in the last ; apothecia small, scattered, simple, a little prominent, round and oblong, the proper margin blackening above, and thus contrasting with the pale, white-powdery disk. Spores, as seen, erucæform, about 20-locular, the cells entire, 30-50 mic. long, about 7 mic. wide, without colour.

Trees, Florida, *Miss Mary L. Wilson*.

16. *G. Poiteoides*, Nyl. ; thallus as in the last ; apothecia somewhat flattened, slender, immersed and emergent, soon much elongated, flexuous, and from simple somewhat branched,

grouped finally in radiating clusters, the proper margin and scarcely at length open disk pale, the rather tumid, thalloid margin rounded. Spores erucæform, 20-24 locular, the cells entire, 40-76 mic. long, 8-12 mic. wide, without colour.—
Nyl. in Wright *Lich. Cub.* 2, 77 (*nomen.*)

Upon bark, Southern Texas, *Hall.* Trees, Florida, *Curtiss.*
—No character of this lichen has appeared as yet.



APPENDIX.

The following are descriptions of Lecideei referred to in Prof. Tuckerman's MS. of which I have seen specimens from his Herb.

1. *Biatora furvo-nigrans*, Tuckerm. herb; thallus effuse, thin, uneven, brown, on a black hypothallus; apothecia minute, sessile, convex, immarginate, from brown soon blackening. "Hypothecium pale, paraphyses conglutinate, brown at the tips. Spores simple, oblong, 10-15 by 3-5 mic." On bark, Washington Terr., *Suksdorf*, 1882, *in herb. Sprague*.

2. *B. pullula*, *ad int.* Tuckerm. herb.; "like *B. holopolia*, but the thallus deficient. Spores 9-12 by 4-7 mic." On dead wood, Washington Terr., *Suksdorf*, 1882, *in herb. Sprague*.

3. *B. vulpecula*, Tuckerm. herb.: *nomen.* Not seen.

4. *B. Meadii*, Tuckerm. herb.; thallus greenish-yellow, minutely areolate; apothecia numerous, sessile, small, the entire obtuse margin paler than the pale-brownish and darkening disk, the hypothecium colourless, the paraphyses conglutinate. Spores 2-4-locular, oblong-ellipsoid, 11-14 by 3-5 mic. On bark, Florida, *E. D. Mead*, 1885. Only a single small specimen seen.

5. *B. triseptata*, (Hepp.) *v. artytoides*, Tuckerm. in *Wright Cub. n. 207, Genera*, p. 162, note. *Lecidea artytoides*, Nyl. *Pr. N. Gr.* p. 57. "Thallus white, opake, granulose, or verrucose-granulose; apothecia brownish-black, opake, plane, usually aggregated, the thin paler margin blackening, the hypothecium brownish-black above, the paraphyses slender, irregular. Spores oblong, 4-locular, 20-25 by 7-8 mic." *Nyl. l. c.* On stones, Cordoba, Mexico, *Farlow*, 1885, *in herb. Tuckerm.*

6. *B. dryina*, (Ach., Nyl. *Scand.* p. 211); "thallus white, subleprose, thin, effuse; apothecia small, often angulose, black, the margin thin, the hypothecium dark, the paraphyses slender. Spores needle-shaped, many-locular, 46-56 by 3-4 mic."—A California lichen on dead wood, Miss Wilson, in herb. Tuckerm., said to have determined by Nyl. as "*Lecidea patellarioides*, Nyl.," is supposed to be the plant referred to: and Nyl. in Obs. on Corsican lichens in *Flora*, 1878, p. 453, says there is little difference between the two. —*Lecidea dryina*, Ach. *Meth.* p. 34.

7. *B. albidula*, Willey herb.; thallus very thin, white; apothecia minute, sessile, the margin thin, the disk white, the hypothecium colourless, the paraphyses conglutinate. Spores numerous, oblong, simple, 6-7 by 2-3 mic. On beech, New Bedford, Willey.—A very minute and as yet rare lichen.

8. *B. difformis*, (Fr.); "thallus deficient; apothecia plane or convex, marginate or immarginate, black, naked, opake, the hypothecium dark. Spores numerous, minute, globose. *Tromera sarcogynoides*, Massal. in Koerb. Parerg. p. 453."—Wainio *Adjuv. II.* p. 143, sub *Biatorella. Peziza*, Fr. *Symb. Myc.* p. 151. *Lecidea*, Nyl. *Peziz. Fenn.* p. 68. A plant of pine gum, New Bedford, and fir gum, White Mts., in herb. Willey, may belong here. It gives a strong blue reaction with iodine. Nyl. *Lapp. Or.* p. 185, considers it a black form of *B. resinæ*; and see Minks *Symbolæ I*, p. 78.

9. *Lecidea mamillana*, Tuckerm. *Obs. 1877*, p. 180; "thallus squamaceous-areolate but now reduced, glaucous (or whitened) the areoles turgid, radiate-striate, and sublobate, discrete or aggregated; apothecia minute, centrally innate in the areoles, planocconvex, naked, with a thin vanishing margin; hypothecium brown, the paraphyses conglutinate. Spores 8, simple, 9-18 by 5-9 mic. Spermatia minute, straight, on simple sterigmas. On lime rocks, Alabama, Peters."—(*Toninia*.)

10. *L. aromatica*, (Sw.) Ach. ; "thallus minutely glebose-squamulose, the squamules at length turgescent and plicate ; apothecia adnate, plane, with a thin margin, at length convex and immarginate ; hypothecium brown. Spores fusiform, 4-locular, 10-24 by 4-5 mic." *Lichen aromaticus*, Sw., *Eng. Bot. V. 25, 1807.* *Lecidea*, Ach. *L. U. p. 168.* Th. Fr. *Scand. p. 332.*—The name is given with a ? in herb. Tuckerm. to a California lichen.—(*Toninia*.)

11. *L. micytho*, Tuckerm. herb ; thallus thin, areolate-verruculose, ochraceous, in scattered patches, or obsolete ; apothecia minute, black, soon convex and immarginate, the hypothecium reddish-brown, the paraphyses thickish, at length clavate, brown-headed. Spores ovoid-ellipsoid, simple, 6-10 by 3-5 mic. On quartz, Chester, S. Car. and Pennsylvania, in herb. *Eckfeldt*.

12. *L. planetica*, Tuckerm. herb. ; thallus thin, effuse, verrucose, glaucous ; apothecia numerous, minute, from the first convex and immarginate, black, the hypothecium black, the paraphyses concrete. Spores ovoid-ellipsoid, simple, 5-7 by 2-3½ mic. On rocks, Pennsylvania, *W. Kalm, 1882.*—*L. glaucopsara*, Tuckerm. herb. ad int., perhaps does not differ, except in the at length blackening thallus. On rocks, New York, *Miss Wilson.*—More material is needed for the study of these forms. These three plants belong to the stock of *L. cyrtidia*.

Under *Buellia parasema* is a note : "Rewrite and notice the large spores, and see *B. amphidextra* mihi, and separate *B. Ravenelii.*" The lichens here mentioned I have not seen.

13. *Platygrapha phlyctella*, Nyl. ; "thallus thin, white, determinate ; apothecia rounded, or angular-diform, greyish-pruinose or blackening, within pale. Spores colourless, fusiform, 6-8-locular, 30-46 by 6-8 mic." On bark, Florida, *Miss Wilson*, in herb. Tuckerm.—Nyl. *En. p. 131, (nomen) Exot. p. 229, Pr. N. Gr. p. 94.*

The following are the descriptions of native and exotic lichens by Prof. Tuckerman in his occasional writings.

I.—NATIVE SPECIES.

1. *Ramalina crinita*, Tuckerm. ; "thallus cæspitose, rigid, compressed, sub-dichotomous, linear-laciniate, at length much dilated, greenish-glaucous, the divisions smooth, interruptedly white-striate, and becoming lacunose, attenuate at the summits, and clothed at the margins more or less thickly with strong, solitary or clustered, finally branched black fibrils ; apothecia middling-sized to large, (3-10mm. in width), subterminal and lateral, subpodicellate, varying as to smoothness as the thallus, the margins blackened. Spores oblong-ellipsoid, 15-20 by 5-6 mic. On low shrubs of *Euphorbia misera*, San Diego, Calif. and at Todos Los Santos, Lower Calif., *C. R. Orcutt*. —Comparable with *R. melanothrix*, Laur. from the Cape of Good Hope. Its general aspect suggests the stock of *R. calicaris*."—*Torrey Bulletin*, 1883, p. 43.

2. *Biatora* (§ *Bacidia*) *medialis*, Tuckerm. ; "thallus of soon plane confluent cartilagineous granules, diffract-rimose, cinerascent, confused with a pale hypothallus ; apothecia small, plano-convex, from yellowish pale-red, with an obscure, vanishing margin. Spores from dactyloid-fusiform, staff-shaped, oftener 4-locular, 5-10 times longer than the diameter. Paraphyses soon distinct. On trunks, Nicaragua and Cuba, *Wright*."—*Obs. 1864*, p. 280.—Nyl. has referred here a lichen from Texas, *E. D. Mead*, and Florida, *Eckfeldt*, *Catal. of Florida Lichens*, p. 6. In *Pr. N. Gr.* he gives the spores as "fusiform-acicular, 4-6-locular, 23-27 by 4 mic."

3. *Graphis eulectra*, Tuckerm. ; "thallus sub-cortical ; apothecia scattered, oblong and linear, flexuous, sub-simple, the rimæform disk gaping, the margin of the black excipie inflexed, white-powdered, sunk in a margining thalloid stratum of the same colour. Spores 6-8 in ventricose thekes, oblong, 12-16-locular, 6-8 times longer than the diameter, without

colour, or becoming pale-brown. Trunks in the White Mts. : Illinois, *E. Hall*.—Spores taking a claret colour, at length violet, with iodine. The diversity in the spores from *G. scripta*, is corroborated by the remarkably dilated, stroma-like, accessory exciple, which is comparable with the accessory margin of *Opegrapha herpetica v. subocellata*, but more pronounced ; and sufficiently indicates the lichen to the naked eye.”—*Lich. Calif.* p. 34.

4. *Opegrapha microcyclica*, Tuckerm. ; “thallus crustaceous, effuse, of minute, subtartareous, heaped, brownish-cineraceous granules ; apothecia very minute, rounded-sublirelliform, superficial, black, the plano-concave disk surrounded with a turgid, elevated, inflexed margin. On yellow birch and other trees in the White Mts., and in Western Massachusetts. Our smallest species, and remarkable for its well-developed crust ; the apothecia often pseudo-lecideine, but the spores accord with those of *Opegrapha*.” Tuckerm. *Supp. I.* p. 429, (*O. myriocarpa*), *Obs. 1864*, p. 285, *Genera*, p. 199. —The lichen has not since been collected. Spores 4-loc., without colour, 13-15 by 5-7 mic.

5. *O. oulocheila*, Tuckerm. ; “thallus thin, contiguous, glaucous ; apothecia minute, superficial, rounded-diform and oblong, black, the disk dilated, plane, with a persistent rugulose margin. Spores 2-locular, brown.—Apothecia and spores in the single specimen but half the size of those of *O. cerebrina* ; from which the present differs in its crisped margin, and habitat. On granitic rocks, Salem, N. Car., *Schweinitz*.”—Tuckerm. *Lich. Calif.* p. 32, *Genera*, p. 199. —The specimen in herb. Tuckerm. is effete and without apothecia, and a search which he caused to be made for it more recently proved ineffectual.

6. *O. tribulodes*, Tuckerm. ; “thallus deficient ; apothecia parasitic on the crust of *Trypethelium cruentum*, minute, elliptical and oblong, simple or finally 3-4-cuspidate, black, the disk rimæform, finally somewhat dilated, the hypothecium pale. Spores 8 in short oval or saccate-clavate thekes, ellipsoid, 2-locular, constricted in the middle, brown, 16-21 by 6-9 mic. ; paraphyses subdistinct.—Texas, *Ravenel*. Alabama, *Dr. Curtis* and *C. Mohr*.”—*Genera*, p. 199.

7. *O. demissa*, Tuckerm. ; "thallus thin, whitish or obsolete ; apothecia minute, elliptical, simple, white within, the disk at length somewhat dilated. Spores 8 in clavate thekes, 2-locular, finally brown, constricted in the middle, 16-23 by 6-9 mic. Paraphyses now distinct." On *Rhus venenata* and other barks, New Bedford, Mass., *Willey*. [Maryland and Virginia, *Dr. Eckfeldt.*] *Genera*, p. 199.

8. *O. astræa*, Tuckerm. ; "thallus compact, cinerascent or white or obsolete, black-bordered ; apothecia superficial, plane, shorter or longer, simple or finally stellate-ramose, the disk punctiform or rimæform, and with the demiss margin white-veiled. Spores 8 in crowded thekes, finger-shaped, 4-8-locular, the cells squared, 5-7 times longer than the diameter, mostly without colour.

"a ; apothecia rounded or elliptical, then oblong, simple, with a subpersistent black margin.

"b ; apothecia soon stellate, above clothed with white.—*Graphis*, Nyl. *En. Supp.* On trunks, S. Car., *Ravenel*. Cuba, *Wright*."—*Calif.* p. 33, *Genera*, p. 200.

9. *Arthonia leucastræa*, Tuckerm. ; "thallus effuse, farinaceous, white ; apothecia minute, oblong and elongated, plane, reddish-brown, white-pruinose, finally confluent in a radiate-stellate pseudo-stroma, the hypothecium darkening. Spores 6-8 in pyriform thekes, ovoid, 4-locular, the terminal cells larger, the middle ones now and then divided, 12-16 by 5-7 mic., without colour, the hymenial gelatine finally red with iodine. Trunks, Texas, *Wright*."—*Genera*, p. 220.

10. *A. cupressina*, Tuckerm. ; "thallus effuse, very thin, leprose, white ; apothecia minute (0^{mm}., 2-0^{mm}., 4 wide) rounded, convex, from pale-brown at length darkening, green-pruinose, the hypothecium pale. Spores oblong-ovate or ovoid-oblong, 4-locular, the cells about equal, without colour, 11-16 by 3½-5 mic. Reaction with iodine, blue. On white cedar, New Bedford, Mass., *Willey*."—*Genera*, p. 221.

11. *A. glebosa*, Tuckerm. ; "thallus of tumid, smooth, at length plicate fuscescent squamules ; apothecia rounded,

convex, c. 0mm., 5 wide, soon crowded and confluent, black, the hypothecium brownish-black. Spores ovoid, or oblong-ovoid, 2-locular, constricted in the middle, pale-brown or without colour, 10-16 by 5-6 mic. On mosses on rocks, Calif., *Bolander*. Reaction with iodine, vinous-red."—*Genera*, p. 221.

12. *A. cyrtodes*, Tuckerm.; "thallus thin, subcartilaginous, contiguous, uneven, rimulose, glaucous-cinerascent, somewhat limited by a black hypothallus; apothecia about middle-sized, adnate, rounded, convex, brownish-black, within of the same colour. Spores large, oblong-ellipsoid, 10-12-locular, the cells now muriform-divided, often curved, 3-5 times longer than the diameter, colourless or rarely fuscidulous, paraphyses obsolete.—*A. cyrtodes* & *A. distendens*, Nyl. *Pr. N. Gr.* p. 66.

"a; thallus greenish-glaucous, the hypothallus less distinct, the spores oblong-ellipsoid, the cells entire. *A. cyrtodes*, Nyl. l. c. On trunks, Cuba, *Wright*, n. 245.

"b; thallus at length cinerascent, the hypothallus black, the spores more oblong, and the cells now muriform-divided. *A. distendens*, Nyl. l. c. Cuba, *Wright*, n. 246."—*Obs. 1864*, p. 285.—The spores, according to Nyl. l. c., are 8-12-locular, 70-85 by 21-25 mic.—A Cuban lichen, which may be looked for within our limits. *A. subcyrtodes*, *Willey Supp.* is near to this, but has smaller spores, 4-8 in the thekes. On bark, Florida.

13. *Chiodection Californicum*, Tuckerm.; "thallus subtar-taceous, verruculose, pale ochroleucus; apothecia lecanoroid, adnate, somewhat plane, the exterior exciple with an obtuse entire thalline margin including a black disk clothed with a perforated veil of the same colour as the margin, at length flexuous-irregular, stellate and lirellate. Spores from dactyloid-ellipsoid, 4-8-locular, brown, 20-30 by 5-8 mic. On bark, San Diego, Calif., *Dr. E. Palmer*. Apothecia now suggesting those of *Chiodection sphærale*." On bark, San Diego, Calif., *Dr. E. Palmer*.—*Thelotrema* dein (*in litt.*) *Chiodection*, *Obs. 1877*, p. 177.

14. *C. Montagnæi*, Tuckerm.; "thallus effuse, granulose,

glaucous, the circumference cottony and white; apothecia rounded, confluent, depressed, plano-convex, white, the ostioles in the dry plant white-veiled, when moistened serially-aggregated and prominent. Spores immature." *C. lacteum* *Mont. Cub.* p. 161. "Spores 8, in obovate thekes, oblong-ovoid, muriform-multilocular, 2-3½ times longer than broad. Louisiana, *Hale.*"—*Genera*, p. 215.—Montagne's name is changed to avoid confusion with *C. lacteum*, Fée, a different plant.

✓ 15. *Glyphis Achariana*, Tuckerm.; "thallus effuse, smooth, greenish-fuscescent; apothecia subsolitary, rounded-subangulose, or radiate-ramose and confluent, medusiform, dark-brown, plano-concave. Spores oblong, 7-10-locular, without colour, 3-6 times longer than wide. On bark, Southern States."—*Supp. I.* p. 429, *Genera*, p. 216. *G. favulosa* and *G. cicatricosa*, Ach. and *G. confusa*, (Ach.) Nyl.

✓ 16. *Acolium Carolinianum*, Tuckerm.; "thallus tartareous, even, or at length rugulose-rimose, from glauecent pale yellow; apothecia innate in tumid thalline warts, the disk plano-convex, black, the margin deficient. Spores ellipsoid, 2-locular, brown, 12-18 by 7-9 mic. On cedar logs, S. Car., *Dr. Mellichamp.*"—*Genera*, p. 237.

17. *A. chloroconium*, Tuckerm.; "thallus thin, plicate-verruculose, glauecent; apothecia innate-prominent, black, the disk yellowish-green-powdery, exceeding the yellow at length black margin. Spores in cylindrical thekes, small, obtusely-ellipsoid, constricted in the middle, brown, 7-12 by 5-6 mic. On bark, California."—*Lich. Calif.* p. 28, *Genera*, p. 238.

18. *A. Bolanderi*, Tuckerm.; "thallus areolate-verrucose, fulvous-cinereous, with a subfimbriate blackening hypothallus; apothecia innate in tumid warts, the disk somewhat plane, black, the margin obsolete. Spores in cylindrical thekes, spherical, simple, brown, 8-16 mic. in diameter. On rocks, Calif., *Bolander*. Spermatia oblong, 3-3½ times longer than wide."—*Lich. Calif.* p. 27, *Genera*, p. 237.

19. *A. Sti. Jacobi*, Tuckerm.; "thallus of white granules soon compacted into a chinky crust; apothecia middling-sized, of the substance and colour of the thallus, more or less turbinate, the interior exciple yellow, the disk more or less protruded, black, but on the surface yellowish-green. Spores (thekes not observed) rounded and short-ellipsoid, 2-locular, 20-40 by 16-30 mic. On the earth, Lower Calif., *C. G. Pringle*."—*Torrey Bull. 1880*, p. 22.

20. *Calicium Curtissii*, Tuckerm.; "thallus cottony, black, or obsolete; apothecia minute, turbinate, the disk polished, black, the stipes short, from white rufescant, finally black. Spores simple or 2-locular, brown, 11-17 by 4-7 mic." On *Rhus typhina*, Northern Atlantic States, various collectors. —*Supp. II. p. 201, Genera*, p. 241.

[The plant referred to under this name in *Genera*, l. c., on alders in the White Mts., *Willey*, appears to be *C. præcedens*, Nyl.]

21. *C. fuscipes*, Tuckerm.; "thallus obsolete; apothecia turbinate-lentiform, the disk convex, black beneath, and the upper portion of the brown stipes as if thinly white-varnished. Spores ellipsoid or oblong-ellipsoid, simple, brown, 9-16 by 4-7 mic.—On dead wood, New Jersey, *Austin*, Canada, *Drummond*."—*Genera p. 240*.

22. *C. Ravenelii*, Tuckerm.; "thallus granulose, glaucous; apothecia turbinate-globose, the incurved margin radiate-striate, the stipes stout, short, brownish-black. Spores ellipsoid or fusiform-ellipsoid, simple.—On wood, S. Car. *Ravenel*."—*Obs. 1860*, p. 389, *Genera p. 241*.

Pyrenothamnia, Tuckerm. "Apothecia immersed in the thallus, the peritheciun fuscescent, the amphitheciun colourless, the paraphyses diffluent and obsolete. Spores 1-2-4 in saccate-clavate thekes, ellipsoid, muriform-multilocular, 30-56 by 16-24 mic., brown, the transverse series of cells about 4. Thallus fruticulose, cæspitose, about 1-2 inch in height, 2-4 mm. wide, fragile, from a teretish base dilated above and dichotomously much-branched, the obtuse tips crenate-dentate, from cinerascent fuscescent."

23. *P. Spraguei*, Tuckerm.; "growing on mosses on the eastern slope of the Cascade Mts., Washington Terr., alt. 3500-6000 ft. *T. S. Brandegee.*" *Torrey Bull.* 1883, p. 22.

24. *Endocarpon ochroleucum*, Tuckerm.; "thallus thick, areolate-diffract, yellowish-green, the areoles smooth, turgescent, crowded, the central ones substipitate, those of the circumference lobulate; apothecia immersed, the peritheciun black, the amphitheciun blackening. Spores 6-8 in lanceolate thekes, boat-shaped, bilocular, the cells approximate, pale-brownish-black, 18-26 by $3\frac{1}{2}$ - $5\frac{1}{2}$ mic.—Rocks, Calif. *Bolander.*"—*Genera p. 250.*—[Dr. J. Müller in *Beitr. n.º 978*, considers it the type of a new genus, *HETEROCARPON.*]

25. *Staurothele Drummondii*, Tuckerm.; "thallus determinate, subcartilagineous, rugose-verrucose, radiate-subplicate at the circumference, blackish-brown, the hypothallus indistinct; apothecia sunk in minute thalline warts, with a prominent black ostiole. Spores (1-2?) in saccate thekes, from cocciform oblong, muriform-multilocular, blackish-brown, 30-40 by 11-20 mic.—Lime rocks, Kingston, Canada, *Drummond.*" *Obs. 1864*, p. 286. (*Verrucaria*.) *Genera p. 257.*

26. *S. circinata*, Tuckerm.; "thallus crustaceous, orbicular, thin, contiguous, smooth, or at length rimose, zonate at the circumference, olivaceous-brown, the hypothallus darkening, fimbriate; apothecia concentrically disposed, protuberant, the peritheciun soon naked, black, the amphitheciun white. Spores 1-2, ellipsoid, muriform-multilocular, brown, 34-46 by 16-20 mic. Lime rock, Trenton Falls, N. Y."—*Genera p. 257.*

27. *S. Brandegeei*, Tuckerm.; "thallus fruticulose, 3-5 mm. in height, erect, of rounded, finger-shaped branchlets, soon compressed and dilated and lobed above in a verrucose more or less stiped crust, brown, paler beneath; apothecia globose. Spores solitary, muriform-multilocular, blackish-brown, 26-50 by 20-24 mic., the paraphyses diffluent.—Mountains of Washington Terr. *Brandegee* in *herb. Sprague.*"—*Torr. Bull. 1884*, p. 26.

28. *Trypethelium virens*, Tuckerm. ; "thallus thin, smooth, greenish-yellow ; stromas rather prominent, irregularly rounded, confluent, of the same colour as the crust ; ostioles minute, not prominent, black."—*Darlington, Fl. Cestr. Edit. 3*, p. 453. *Nyl. Pr. N. Gr.* p. 128. *Tuckerman, Gen.* p. 260.—Trees along the Atlantic coast North and South. Spores in the New Bedford specimens oblong, 4-8 locular 25-50 by 9-15 mic., without colour.

29. *T. mastoideum*, Ach. ; "thallus thin, fuscous, or from cinereous, olivaceous or yellow, becoming pale, black bordered ; stromas brown, irregularly angular or now confluent, convex, gibbose-uneven, the perithecia at length prominent, naked, emergent, within yellow-cineraceous or blackening. Spores oblong-ellipsoid, 4 locular, 18-22 by 7-8 mic."—On bark, Southern Atlantic States.—*Ach. L. U.* p. 307, *Syn.* p. 305. *T. Carolinianum*, Tuckerm. *Suppl. I.*, p. 429, and *T. scoria* Nyl., *Pyrenoc.* p. 74 (excl. syn.) and *Tuckerm. Gen.* p. 360, *fide J. Müller, Pyrenocarp. Cubens.* (1885), p. 390. *Wright, Cub.* n. 167, 168, &c., *ib. l. c.*

30. *T. Catervarium*, (Fée) Tuckerm. ; "very variable ; stromas at first not white, but pale ferruginous-fuscous, then pale-decolorate, broader or narrower, sometimes linear, variously elongated, or only forming a narrow pale ring about the apothecia, of which the ostioles are minutely punctiform, but which are sometimes more visible above." Spores ellipsoid, 4 locular, colourless, 14-16 by 5½-7 mic.—*Verrucaria Fée Ess.* p. 90, t. 22, f. 1, *Nyl. Pyren.* p. 52. *Trypethelium*, Tuckerm. *Gen.* p. 260, Müller, l. c. p. 391. *Wright Cub.* n. 159, 179, &c.—Trunks, Alabama. *Beaufort.*

31. *T. scorites*, Tuckerm. ; "thallus a pale spot ; apothecia in fuscous, irregularly rounded or difform, convex stromas, within white, perithecia black, the ostioles scarcely perceptible. Spores 6-8 locular, oblong, without colour, 42-52 by 12-17 mic." *Nyl. Pr. N. Gr.* p. 128. *Tuckerm. Gen.* p. 260.—On trunks, Mississippi and N. Car., *M. A. Curtis*, in herb. Tuckerm.

32. *T. exocanthum*, Tuckerm.; "thallus subcortical: apothecia black, in an elevated hemispherical subglobose stroma which is white within. Spores oblong, without colour, 41-46 by 9-12 mic. Trunks, Alabama and Louisiana." *Gen. p. 260.*

[*T. pallescens*, (Fée) Nyl. in Tuckerm. *Gen. p. 260*, is, according to Müller, l. c. p. 392, *T. ochroleucum*, Nyl. *v. pallescens*.—*T. heterochroum* (Mont.) referred to in *Gen. p. 260* is *T. Kunzei*, Fée, Müller, l. c. p. 390.—On *Ilex*, Florida, *E. A. Rau*.—*Pyrenula tropica* (Ach.) Tuckerm. *Gen. p. 273*, and *P. aggregata* (Fée), *ib. l. c. p. 274*, are referred by Müller, l. c. p. 393, and 396, to *Trypethelium*; the latter to *Melanotheca*, which is only *Trypethelium* with simply 4 locular coloured spores.]

33. *Sagedia Cestrensis*, Tuckerm.; "thallus conspicuous, chunky, dark-blackish-green; perithecia dimidiate, inflexed at the base, much covered by the thallus, but prominent, hemispherical; Spores from fusiform acicular, 30-50 by 2½-5 mic., or even 72-118 by 3-4 mic., without colour." On trunks, Atlantic states, north and south: [and on rocks, New Bedford, *Willey*.]—*Darlington, Fl. Cest. Edit. 3, p. 452. Gen. p. 265.*

34. *Verrucaria microbola*, Tuckerm.; "thallus of minute, rounded, olivaceous, becoming grayish, commonly discrete, granules; apothecia minute, less than half the size of those of *V. pyrenophora*. Spores ovoid, 4 locular, 23-30 by 9-11 mic.—On lime rocks, Canada, *Drummond*."—*Genera p. 269.*

35. *Pyrenula mamillana*, (Ach.) Trev.; "thallus membranaceous, smooth, pale-fuscous-green, black bordered." *Ach. Syn. p. 92.* "Apothecia deplanate, obtusely umbonate, often subuplicate." Müller, *Pyr. Cub. p. 411.* "Spores ellipsoid 4 locular, brown, 16-18 by 7-8 mic." Nyl. *Pr. N. Gr. p. 117.*—*Verrucaria Santensis* Tuckerm. in Nyl. *Pyrenoc. p. 45*, (var. *V. aggregate*), dein *Pr. N. Gr. 117* (sub. sp. *V. marginatae*). *P. mamillana v. Santensis*, Tuckerm. *Gen. p. 274.* Müller *l. c. p. 411, Beitr. n. 487. Wright, Cub. n. 43, 46, &c.*—On bark, Southern States.

36. *P. pachycheila*, Tuckerm.; "thallus subcortical; apothecia covered, either solitary, tumid-prominent, or several aggregated in difform warts, black, the paraphyses capillary. Spores 8, from ellipsoid oblong, submuriform-multilocular, (the transverse series of cells 8-10, the longitudinal 2-3) becoming brown, 30-69 by 14-23 mic."—*Gen. p. 274*, where see the synonymy.—Trunks, Southern States.

37. *P. thelomorpha*, Tuckerm.; like the preceding, but with smaller apothecia, and the spores not exceeding 23-30 by 7-11 mic.—*Genera p. 275*.

38. *Pyrenastrum Ravenelii*, Tuckerm.; "thallus membranaceous, thin, somewhat waxy, fuscous; warts conoid-elevated, covered with the thallus, but at length naked, the perithecia flask-shaped, convergent but not confluent, the ostioles pale, acute. Spores 8, ellipsoid, muriform-multilocular, the transverse cells 8-10, the longitudinal at the middle 5-6, (38-76 by 16-27 mic.)—On trunks, Southern States.—*Supp. I., p. 426, Gen. p. 277.*

NOTE.

Buellia Catawbensis, Willey Supp. is to be called *Dermatiscum Catawicense* (Willey) Nyl. in litt. ad H. A. Green. *Dermatiscum* is a genus founded upon *Endocarpon Thunbergii*, Ach. Syn., p. 101, a South African lichen. It is placed by Nylander, in his Synopsis, among the Lecanorei, just before *Urceolaria*. A definition of the genus was given by Nylander in Mohl & de Bary's Bot. Zeit., 1867, p. 133. I have not seen it. *Umbilicaria flavo-virescens*, Leight., in Journ. Linn. Soc. 1869, pp. 33-35, is a synonym of the African plant.

II.—EXOTIC SPECIES.

1. *Ramalina dasypoga*, Tuckerm. ; thallus filamentous, stiffish, fragile, round, smooth, greenish-fuscescent and paler, the branches elongated, dichotomous, the terminal ones acuminate, nodulose ; apothecia concave, then plane, with a thin incurved subcrenulate vanishing margin. Spores ellipsoid, curved, 2-locular, 2 times longer than broad. — On trees and rocks, Cuba, *Wright*. Allied to *R. unseoides*, Nyl. — *Supp.* 2, p. 203.

2. *R. Manni*, Tuckerm. ; thallus subfoliaceous, depressed, lacerate-laciniate, glaucous, beneath blackening, the laciniae lacunose, crenate-dentate at the margin, the fertile ones erectish ; apothecia podicellate, the margin vanishing. Spores 8, small, 2-locular, curved, 2-2½ times longer than broad. — Trees, East Maui, *Mann*. — Exhibits a close approach to the foliaceous thallus of *Cetraria* ; and the depressed habit and differently-coloured sides are new to the present genus, with which it is none the less associated by the characters of fructification. — *Haw.* p. 223.

3. *Alectoria Japonica*, Tuckerm. ; thallus subcæspitose, round, rigid, beset with white soredia, strawcoloured, the sterile branches very much branching, intertwined, attenuate, subfilamentose, the fertile ones thickened, blackening at the tips ; apothecia subterminal, superficial, sessile, appendiculate, the disk concave, finally expanded, shining, chestnut-coloured. Spores large, ellipsoid, greenish-fuscescent, at length without colour. — On dead pine trees, Ayan, Japan, *Wright*. Nearest to *A. ochroleuca*. — *Supp.* 2, p. 201.

4. *Parmelia Japonica*, Tuckerm. ; thallus foliaceous-imbricate, subcoriaceous, smooth, glaucescent, the laciniae sinuate-multifid, moniliform-constricted, plano-convex, palmate-cristulate at the apex, beneath white, interruptedly covered with spongiosa-pannose fuscous-black pulvinules : apothecia middling-sized, brown, with an incurved subcrenate margin. Spores not found. — On birch trunks in mountains, Japan, *Wright*. Compared to *P. moniliformis* Bab. *N. Zeal.* p. 23, t. 127, f. 3, and *P. physodes*. — *Obs.* 1862, p. 399.

5. *P. cervicornis*, Tuckerm. ; thallus foliaceous, horizontal, appressed, cartilaginous, smooth, glaucescent, of loosely-imbricated, elongated-linear, plano-concave lobes, which are irregularly dichotomous, and with forked, divergent, obtuse tips ; beneath black, and covered rather sparsely with small papillæ, passing, especially at the margins, into branched, densely-crowded fibrils ; apothecia large, elevated-subpodicellate, scutellæform, at length explanate, the disk dark chestnut, the entire margin at length coarsely crenate. Spores largish, ovoid-ellipsoid.—Sandwich Islands.—*Wilkes Exp. p. 140 and t. 2, f. 1-6.*

6. *Sticta Pickeringii*, Tuckerm. ; thallus cartilaginous, smooth, glaucous-flavescent or at length darker, the lobes rounded and sinuate-laciniate, beset at the margin with leaflets and coraloid branchlets ; beneath tomentose, yellowish-brown, becoming blackish at the centre. Cyphellæ punctiform ; apothecia middling-sized, podicellate, the disk at length convex, reddish-black, externally rugulose-papillate.—New Zealand. *Wilkes Exp. 138 & 1 f. 6.*

6. *Sticta Wrightii*, Tuckerm. ; thallus subcoriaceous, appressed, smooth, greenish-glaucous, the laciniae rounded, sinuate-incised, beneath brown, pale at the circumference, tomentose, the cyphellæ plano-concave, white ; apothecia scattered, elevated, mammilate externally, from concave plane, the margin inflexed, irregular, sub-evanescent. Spores broadly fusiform, 2 locular, brown, 5 times longer than broad.—Trees, Japan, *Wright.*—*Supp. 2, p. 204. Ricasolia, Nyl. Syn. I., p. 366.* Spores 55-68 by 7½-8 mic.

8. *Sticta crocata v. mallota*, Tuckerm., *Syn. I.*, p. 100.

9. *Peltigera polydactyla v. Fuegensis*, Tuckerm. ; thallus blackish-green, the lobes narrow, beneath effibrillose, tomentose, reticulate with thick veins ; apothecia horizontal, brownish black.—Orange Harbor, *Wilkes Exp. p. 133, and t. I, f. 5.*

10. *Erioderma velligerum*, Tuckerm. ; news ub-sp. ; thallus imbricate, cinerascent, the lobes ascendant, rounded, sinuate-incised, the margins somewhat crisped and densely hirsute,

sulphur-colored beneath; apothecia (2-4 mm. wide) marginal, externally hirsute, the disk fuscous. Spores 8, rounded-ellipsoid, simple, 9-16 by 8-10 mic. slightly coloured in the thekes, then without colour.—Shores of the Straits of Magellan, *Dr. Thomas Hill*, (Hassler Exp. 1872). Near to *E. Chilense*, Mont.—*Obs. 1877*, p. 168.

11. *E. Wrightii*, Tuckerm.; thallus coriaceous, thick, soft, tomentose, greenish-fuscous, the lobes somewhat narrowed, deeply sinuate-divided, rounded-crenate at the circumference, beneath covered with a dense fuscous-black tomentose and spongiaceous-pannose hypothallus; apothecia podicellate, sub-marginally attached to discoid lobules.—Trees, Cuba, *Wright*.—*Supp. I*, p. 423.

12. *Pannaria Taylori*, Tuckerm.; *Torrey Bulletin*, 1875, p. 57, described from a specimen collected by Hooker, in herb. Taylor, is *P. placodopsis* Nyl. *Jour. of Bot. Nov. 1875*, and *Lecanora dichroa*, Tayl.—*Obs. 1877*, p. 183.

13. *P. glaucescens*, Tuckerm.; thallus foliaceous, cartilaginous, closely appressed, glaucous-cinerascent, beneath pale, the hypothallus obsolete, the lobes radiant, subentire: apothecia 0 mm. 6-8 wide, lecanorine, adnate, the demiss margin entire, the disk at length convex, fuscous-black. Spores immature. Elongated cells of medullary layer compact. Gonimia 4-9 mm. in diameter, in chains often of 4-10. As the preceding, *Dr. Kidder*, 1875, l. c. p. 57, and *Obs. 1877*, p. 183.

14. *P. symptochia*, Tuckerm.; thallus foliaceous, membranaceous-cartilagineous, cæspitose-polyphyllous, livid-fuscous, the lobes sinuate-repand, flexuous, complicated, beneath naked, brown; hypothallus obsolete; apothecia (c. 1 mm. wide) biatorine, sessile, the brown thin margin very entire, the disk convex, black, opaque. Spores 8, ellipsoid, simple, colourless, 9-16 by 7-10 mic., the distinct paraphyses somewhat thickened. Gonimia disposed in short chains.—Rocks, Island of Juan Fernandez, Hassler Exp. 1872.—*Obs. 1877*, p. 168.

15. *Physcidia Wrightii*, Tuckerm.; thallus foliaceous, suborbicular, thin or narrowly lobed; loosely or closely imbricated, irregularly and above somewhat palmately many-cleft, sending out here and there terete, simple, or rarely a little branched, finally crowded, coralloid branchlets; from pale-greenish greenish-strawcoloured: hypothallus of delicate, colourless, much-branched, anastomosing filaments; apothecia scattered, middling-sized, or largish; the inflexed plicate-crenulate margin becoming flexuous-lobulate, the disk naked, waxy, from pale-yellow to orangecoloured. Spores 8 in club-shaped thekes, smallish, colourless, needle-shaped, commonly 4, but at length plurilocular, 8-16 times longer than wide; paraphyses indistinct. Trees, Cuba, Wright.—? *Physcia*, *Supp.* 2, p. 204, then *Physcidia*, *Obs.* 1862, p. 400.

16. *P. squamulosa*, Tuckerm.; thallus crustaceous, of minute, roundish, scale-like granules, scattered over a fibrillose, radiant, at length byssine-pannose hypothallus; apothecia plane, crenulate, then flexuous-lobulate, orangecoloured. Spores needle-shaped, very slender, 6-12 times longer than broad.—As the preceding, *l. c. p. 401*.—The author observes that large sets of both lichens afforded no clear indication of the passage of one into the other, but that such passage appeared probable. A MS. note of his, however, in my copy, says of the latter: “a remarkable variety but not a species.”

17. *Omphalaria leptophylla*, Tuckerm.; thallus membranaceous-cartilagineous, smooth, blackish-green, beneath of nearly the same colour, divided from the centre into rounded, spreading, undulate soon sinuate lobes which are broader at the summit: apothecia minute, submarginal, innate-prominent, tuberculiform, at length pale, the disk punctiform. Spores 8 in long-clavate thekes, ellipsoid or oblong-ellipsoid, simple, colourless, guttated, $1\frac{1}{2}$ - $2\frac{1}{2}$ times longer than wide; paraphyses distinct, filiform.—Rocks in rivulets, Cuba, Wright.—*Obs.* 1862, p. 384.

18. *O. lingulata*, Tuckerm.; thallus subcartilagineous, greenish-fuscescent and blackening, umbilicate-affixed, divided into spatulate-oblong, subsimple, plano-convex lobes, which are darker beneath; apothecia scattered, minute,

innate, pale, the impressed disk surrounded finally with a somewhat conspicuous entire margin. Spores 8 in clavate thekes, colourless, simple, guttated, 2-3 times longer than wide. *Gonimia glomerulata*.—Rocks, Cuba, *Wright*, *l. c. p. 384*.

19. *O. Wrightii*, Tuckerm. ; Cuba. Described in *Genera*, *p. 72*.

20. *O. deusta*, Tuckerm. ; Cuba. *Genera*, *p. 73*.

21. *O. Cubana*, Tuckerm. ; Cuba. *Genera*, *p. 83*.

22. *Collema stellatum*, Tuckerm. ; thallus cartilagineous, firm, greenish-glaucous, of narrow, sparingly and irregularly branched convex lobules, their tips either simple, or at length forked, or even fastigiately divided ; apothecia middling-sized, convex. Spores 8, broad-fusiform, 2 locular, 3-3½ times longer than wide.—Wet rocks, Cuba, *Wright*.—*Obs. 1862*, *p. 388*.

23. *Placodium erythranthum*, Tuckerm. ; thallus uniform, thin, rimulose, whitish-glaucous: apothecia middling-sized, sessile, the disk plane, dark orangecoloured, with a thin, crenulate, thalline margin. Spores 8, ellipsoid, polar-bilocular, 2-2½ times longer than wide.—Trees, Cuba, *Wright*, *l. c. p. 402*.

24. *P. phœum*, Tuckerm. ; thallus subcartilagineous, smooth, soon interruptedly subareolate, greenish-glaucous, on a conspicuous black hypothallus ; apothecia sessile, biatorine, plano-convex, the disk brown, the very entire margin of nearly the same colour. Spores small, ovoid-ellipsoid, polar-bilocular, 1½-2½ times longer than wide.—Calcareous rocks, Cuba, *Wright*.—*Obs. 1864*, *p. 266*, and *Lich. Cub. n. 112*.

25. *P. ferruginosum*, Tuckerm. ; thallus uniform, rimose areolate, orangecoloured, the areoles now and then lobulate, the hypothallus black ; apothecia 0.6-0.9 mm. wide, biatorine,

sessile, ferruginous and blackening, the margin at length flexuous. Spores 8, polar-bilocular, 16-21 by 6-9 mic.—Volcanic rocks, Island of Chiloe. Hassler Exp. 1872.—*Obs. 1877, p. 171.*

26. *P. ferrugineum*, * *miniaceum*, Tuckerm. ; apothecia vermillioncoloured.—Bushes, Cape of Good Hope, *Wright*.—*l. c. p. 171.*

27. *P. albidellum*, Tuckerm. ; thallus areolate-verruculose, glaucous ; apothecia minute, sessile, at length lutescent, the disk plane, pulverulent, the margin obtuse. Spores middling-sized, polar-bilocular, 2-3 times longer than wide.—On lava, Oahu, *H. Mann*.—*Haw. p. 226.*

28. *P. spadiceum*, Tuckerm. ; thallus of soon elongated, isidioid ascendent, ramulose, finally stipate cinereous-fuscescent granules ; apothecia middling-sized, biatorine, sessile, the disk plane, naked, chestnutcoloured, with a thin, elevated, paler, entire margin, the thalline margin obsolescent. Spores 8, ellipsoid, polar 4-locular, 2-3 times longer than wide.—Trees, Oahu, *H. Mann*.—*l. c. p. 226.*

29. *P. Paumotense*, Tuckerm. ; thallus subcartilagineous, adnate, glaucous-white, delicately pruinose ; the lobes irregularly imbricated, here and there growing together, linear, multifid, flattish, more or less sorediate or altogether granulate ; hypothallus black ; apothecia sessile, with a tumid, at length crenulate, finally excluded thalline margin, the disk plano-convex, opaque, rufous-black.—Carlshoff Island, Paumotu Group.—*Wilkes Exp. p. 146.*—The specimen has been lost from the government collection.

30. *P. bicolor*, Tuckerm., *Torrey Bulletin, 1875, p. 57*, Kerguelens land, Dr. Kidder, is *Lecanora gelida*, v. *lateritia*, Nyl.—*Obs. 1887, p. 184.*—*Placodium* (§ *Placopsis*) *bicolor*, Müll. Arg. *Nachtr. z. Naumann Exp. p. 135.*

31. *Lecanora campalea*, Tuckerm. ; thallus tartareous, verrucose-subplicate, smooth, greenish-glaucous, and paler, the hypothallus black ; apothecia appressed, finally

flexuous-irregular, the tumid disk from red fuscous-black, the thalline margin entire, pale. Spores about 8, elongate-fusiform, 5-plurilocular, 10-15 times longer than wide.—
—Trees, Cuba, *Wright.*—*Supp. 2, p. 205.*

32. *L. subflava*, Tuckerm. ; thallus cartilagineous, smooth, becoming rimulose and granulate, pale yellow, intersected by the black hypothallus ; apothecia middling-sized, sessile, the disk plano-convex, fulvescent, the margin obtuse, entire. Spores ovoid-ellipsoid, simple, $1\frac{1}{2}$ - $2\frac{1}{2}$ times longer than wide.
—Trees, Cuba, *Wright.*—*Obs. 1864, p. 267.*

33. *L. glaucovirens*, Tuckerm. ; thallus uniform, orbicular, verruculose-granulose, greenish-glaucous, white at the circumference, the hypothallus without colour ; apothecia (0.7-1 mm. wide), appressed, the disk soon convex, from livid-fuscous blackening, the margin very entire. Spores 8, ellipsoid, simple, 14-17 by 6-9 mic., the paraphyses conglutinate. Spermatia needle-shaped, bowed.—Trees, Galapagos Islands, Hassler Exp. 1872.—*Obs. 1877, p. 172.*

34. *L. dentilabra*, Tuckerm. ; thallus uniform, thin, areolate-verrucose, glaucous ; apothecia (0.5-0.9 mm. wide) adnate, the disk fuscous, opake, plane or at length tumid, and excluding the swollen, soon split-crenate margin. Spores 8, ellipsoid, simple, 12-25 by 10-16 mic., the paraphyses conglutinate.—On bark, Island of Chiloe, and at Sandy Point, Straits of Magellan, Hassler Exp. 1872.—*l. c. p. 173.*

35. *L. orosthea*, v. *Japonica*, Tuckerm. Apothecia (2-3 mm. wide) elevate-sessile, flexuous-lobate. Spores 20-23 by 8-14 mic.—On beech, Japan, *Wright.*—*Obs. 1877, p. 173.*

36. *Rinodina mamillana*, Tuckerm. : thallus subtartareous, rimose-areolate, pale-strawcoloured, the hypothallus blackening ; apothecia minute, sessile, the obtuse margin soon fuscous-blackening, the disk of the same colour, papillate, at length rugose-plicate. Spores 8, obtusely ellipsoid, 2 locular, brown, 12-20 by 5-10 mic., hypothecium blackish brown.—Volcanic rocks, Oahu, *H. Mann.*—*Haw. p. 227.* And Galapagos Islands, Hassler Exp.—*Obs. 1877, p. 174.*

37. *R. ochrotis*, Tuckerm. ; thallus uniform, granulose, soon splitting, furfuraceous, white ; apothecia (c. 0.5 mm. wide) sessile, the disk from livid-fleshcolour fuscous, the margin obtuse, entire. Spores obtusely ellipsoid, 2 locular, brown, 2-3 times longer than wide.—Charred logs, Cuba, *Wright*.—*Obs. 1877*, *p. 174*.

38. *Pertusaria thamnoplaca*, Tuckerm., *Obs. 1877*, *p. 175*, is, according to the author *in litt.*, the same as *P. coccophora*, (Mont.) Crambie. (*Physcia, Mont. Syll.* *p. 330*. *Thelocarpus*, *Nyl. Pyrenoc.* *p. 10*) : thallus fruticulose, cartilaginous, appressed, dichotomous-ramose, whitish fuscous, the branches subterete, papillate-verrucose, beneath white with scattered fibrils of the same colour ; apothecia depressed-globose, the hymenium single, soon papillate-coronate, the ostioles punctiform, black. Spores 8, ellipsoid, simple, 50-72 by 23-38 mic.—Trunks, Sholl Bay, Straits of Magellan, Hassler Exp. 1872.

39. *P. colobina*, Tuckerm. ; thallus uniform, papilliferous, the papillæ at length crowded, and the central ones somewhat elevated ; apothecia scarcely distinguishable from those of the preceding, except by smaller spores, 46-56 by 23-26 mic.—With the preceding, Hassler Exp. 1872.—*l. c. p. 175*.

40. *P. euglypta*, Tuckerm. ; thallus cartilaginous, in-sculpt-rimose, glaucous-cinerascent ; apothecia subglobose (1-1.8 mm. wide), depressed, the hymenia numerous, the ostioles punctiform, black. Spores 3-6, ellipsoid, 92-138 by 40-60 mic.—Granite rocks, Cape of Good Hope, *Wright*.—*l. c. p. 177*.

41. *P. albinea*, Tuckerm. ; thallus thin, rimulose-areolate, white, intersected by black lines : apothecia depressed, hemispherical and deplanate, (0.5-0.8 mm. wide), the hymenia numerous, the ostioles minute, punctiform, black. Spores 8, ellipsoid, 43-58 by 23-40 mic.—On bark, Galapagos Islands, Hassler Exp. 1872.—*l. c. p. 177*.

42. *Gyalecta asteria*, Tuckerm. ; *Obs. 1862*, *p. 414*, *Syn. I. p. 219*.

43. *G. absconsa*, Tuckerm., *l. c. p. 414.* *G. Valenzueliana*, *v. absconsa*, Tuckerm., *Syn. I. p. 220.*

44. *G. nana*, Tuckerm., *l. c. p. 414; Syn. I. p. 220.*

45. *G. carneo-luteola*, Tuckerm. *Obs. 1864, p. 271; Syn. I. p. 220.*

46. *Urceolaria chloroleuca*, Tuckerm. ; thallus tartareous, rugose, from glaucescent yellow, pale sulphur coloured within, the hypothallus white ; apothecia from urceolate soon explane, the proper margin denticulate, reflexed, the disk somewhat convex, black, somewhat cinereous-pruinose, the entire thalline margin evanescent. Spores 8, ovoid-ellipsoid, soon coloured, 4-8 locular, the cells irregularly divided, 2-3 times longer than wide.—Earth, Cuba, *Wright.*—*Obs. 1864, p. 268. Lich. Cub. n. 123.*

Urceolina, Tuckerm. Apothecia urceolate, the white connivent proper excipie enclosing a red disk, the thalline margin evanescent. Spores ellipsoid, without colour: spermatia needle-shaped, bowed, on subsimple sterigmas: thallus crustaceous, effigurate.

47. *U. Kerguelensis*, Tuckerm. ; thallus crustaceous, adnate, areolate-verrucose, dirty orange-coloured, the verrucæ gibbous, coalescent, and at the centre substipitate, the margin effigurate: apothecia (c. 1 mm. wide) immersed, the thin proper margin from pale livid-nigrescent. Spores 8 in a single series, simple, 21-30 by 15-20 mic., the paraphyses filiform.—Rocks, Kerguelens Land, *Dr. Kidder.*—*Torrey Bulletin, 1875, p. 58.*—*In Obs. 1877, p. 184*, the author vindicates the rights of this new genus, against the reference of the lichen to *Lecanora* as *L. Kerguelensis* by Crombie in *Jour. of Bot., App., 1877.*—*Placodium* (§ *Urceolina*) *Kerguelense*, Müll. Arg., *Nachtr. z. Naumann Exp. p. 136.*

48. *Thelotrema lepadodes*, Tuckerm. : thallus effuse, thinly membranaceous-diffract, ashy-white: apothecia superficial, truncate-conoid, or drum-shaped, the aperture ample: a proper urceolate excipie more or less clothed by the thallus,

bordering a blackening white-pruinose disk, which is loosely edged by a white, membranaceous, inflexed, sometimes obscure interior exciple. Spores about 8, large, brown, oblong, muriform-multilocular (the transverse series of cells 16-24, the longitudinal in the middle 4), 3-5 times longer than wide. — Trees, Cuba, *Wright*. — *Obs. 1862*, p. 405, and Oahu, *H. Mann*. — *Haw. p. 228*.

49. *T. platycarpum*, Tuckerm.; thallus effuse, thin, smooth, then rugose, pale, or somewhat fuscous; apothecia large, innate, much dilated, the flat, thin, pale-fuscous disk blackening above and delicately pruinose, bordered by the thin, obscurely greenish, erose, inflexed margin of the interior exciple, the exterior margin splitting into reflexed divisions. Spores small, slightly fuscous, oblong-ellipsoid or dactyloid-ellipsoid, 2-4 locular, the cells roundish. — Cuba, *Wright*. — *Obs. 1862*, p. 406.

50. *T. Santense*, Tuckerm., *l. c. p. 406*, and *Syn. I.*, p. 227.

51. *T. leiostomum*, Tuckerm.; thallus thin, effuse, smooth, rimose-verruculose, glaucous; apothecia immersed, minute, rounded, at length confluent, and passing into irregular, often lirelliform shapes, the exterior exciple bordering the sunken, blackening disk, with a slightly prominent, entire pale margin, the thickish, smoothish veil covering the disk perforated. Spores ellipsoid, brown, with 3 dissepiments and 4 regular sporoblasts, 2-3 times longer than broad. — Cuba, *Wright*. — *l. c. p. 407*.

52. *T. Cubanum*, Tuckerm.; thallus effuse, thin, smooth, rugulose, rimose, from glaucous-green pale yellowish; apothecia large, from conico-hemispherical soon dilated and scutellæform or irregular, the exterior exciple black within, with a thick, at length cleft and recurved white-veiled margin, the disk thick, grayish-black, covered with a crustaceous, white veil. Spores 8, cocciform, 4 locular, brown, the cells at length somewhat divided, 2 times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 407*.

53. *T. auratum*, Tuckerm. ; thallus smooth, rugulose, at length verrucose, thick, pale strawcoloured ; apothecia large, superficial, subglobose, the rounded aperture ample, the exterior urceolate exciple with an erose, incurved, black-punctate margin, the dish yellow-pruinose. Spores 8, colourless, ellipsoid or oblong-ellipsoid, 4-6 locular, the cells more or less divided, 2-2½ times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 408*.

54. *T. Wrightii*, Tuckerm. ; thallus thickish, fragile, smooth, uneven, glaucous-green ; apothecia large, soon open, dilated, subsessile, scutellæform, the exterior exciple bordering with a somewhat elevated, thick, powdery, pale flesh-coloured, finally flexuous margin, the thin, colourless, white-pruinose disk. Spores broadly ellipsoid, the tips acute, or at length broadly spindle-shaped, 4-6 locular, the unequal cells finally divided, 2-4 times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 409*.

55. *T. globulare*, Tuckerm., *l. c. p. 410*, equals *T. pachystomum*, *fide Nyl.*, *Exot. p. 221*, *Pr. N. Gr. p. 41*.

56. *T. actinotum*, Tuckerm. ; thallus thin, smooth, uneven, from glaucous-green yellow, the hypothallus blackening ; apothecia middling-sized, minute-prominent, at length dilated, from rounded difform, the exterior erectish, soon cleft, recurved exciple enclosing a plane, pale, white-pruinose disk. Spores about 8, colourless, fusiform, 4-10 locular, 4-8 times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 411*.

57. *T. myrioporum*, Tuckerm. ; thallus thin, subcartilaginous, verruculose, smooth, subpruinose, glaucous ; apothecia minute, immersed, rounded, open, or scattered or disposed in irregular confluent groups, the exterior exciple urceolate, with a slightly prominent, very entire margin, the disk a little concave, clothed at length with a white, perforated, irregular veil. Spores small, colourless, ellipsoid, 2 locular, 1½-2½ times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 412*.

58. *T. latilabrum*, Tuckerm.; thallus thickish, smooth, uneven, at length rugulose, from glaucous olivaceous-brownish; apothecia large, innate-prominent, from urceolate-scutellæform at length dilated, the broad, acute, stellate-cleft, reflexed, white-powdery margin of the exterior exciple enclosing a plane, blackening disk, covered with a subcrustaceous at length torn veil. Spores 8, colourless, oblong, 6-8 locular, 3-6 times longer than wide.—Trees, Cuba, *Wright.*—*Obs. 1864*, p. 269. *Lich. Cub. n. 137.*

59. *T. leucastrum*, Tuckerm.; thallus cartilagineous, thin, smooth, pale-olivebrownish, the hypothallus brownish-black; apothecia large, innate, scutellæform, dilated, the reflexed, stellate-cleft, white-powdery exterior exciple enclosing a thin, plane, white-pruinose disk, the interior one wanting. Spores 8, in a single series, small, pale-brown, cocciform-ellipsoid and elongated, 3-4 locular, 2-3 times longer than wide.

b. *difforme*; apothecia smaller, confluent, elongated, differently difform, the powdery margin somewhat dissolved. Trees, Cuba, *Wright.*—*l. c. p. 269. Lich. Cub. n. 158, 159.*

60. *T. platycarpoides*, Tuckerm.; thallus cartilagineous, thin, at length rugulose, pale-greenish-fuscescent; apothecia middling-sized, innate-prominent, urceolate-scutellæform, the aperture ample, the elevated, subentire, at length reflexed exterior exciple surrounding a plane, thin, blackening, white-pruinose disk, the interior one membranaceous, white, connivent. Spores 8, pale brown, ellipsoid with acute tips, then somewhat elongated, and the tips attenuate, 4-6 locular, $3\frac{1}{2}$ - $4\frac{1}{2}$ times longer than wide.—Trees, Cuba, *Wright.*—*l. c. p. 270. Lich. Cub. n. 157.*

61. *T. lirelliforme*, Tuckerm.; thallus thickish, thinly rugose-granulate, smooth, at length somewhat mealy-tartaceous, from glaucous green ashcoloured, the hypothallus brownish-black; apothecia large, innate, lirellate-difform, the prominent, thick, subentire margin of the exterior exciple enclosing a black disk covered with a white veil. Spores 8, oblong-ellipsoid, 4 locular, brown, $2\frac{1}{2}$ - $2\frac{3}{4}$ times longer than wide.—Trees, Cuba, *Wright.*—*l. c. p. 270. Lich. Cub. n. 150.*

62. *T. catastictum*, Tuckerm. ; thallus subtartareous, uneven, at length delicately powdery, glaucescent ; apothecia minute, immersed, urceolate, somewhat bordered by the thallus, the aperture ample, the incurved margin of the loose exciple enclosing a conoid, blackening disk. Spores 8, in elongated thekes, pale brown, broadly oblong-ellipsoid, 6-8 locular, the cells lenshaped, 2-3 times longer than wide. — Trees, Cuba, *Wright*. — *l. c. p. 270.*

63. *T. simplex*, Tuckerm. ; thallus thickish, rugose-verrucose, smooth, pale-ashcoloured, ; apothecia numerous, very small, immersed in somewhat bordering thalline warts, the pale, subglobose, continuous, above naked, radiately somewhat striate, poroid-pertuse exciple enclosing a nucleiform, livid disk. Spores 8, soon brown, ellipsoid, 4-8 locular, the cells at length muriform-divided, 1½-3 times longer than wide. Trees, Cuba, *Wright*. — *l. c. p. 271. Lich. Cub. n. 154.*

64. *T. * piluliferum*, Tuckerm. ; thallus subtartareous, contiguous, even or verruculose, glaucescent or white, confused with the hypothallus ; apothecia numerous, superficial, globular, almost closed, with a pertuse pore, the exterior proper, entire, dark exciple, enclosing a pale, concave disk. Spores 8, cocciform, muriform, colourless, about 2 times longer than wide. — Trees, Oahu, *H. Mann*. — *Haw. p. 227.*

65. *Stereocaulon pilophoroides*, Tuckerm. ; podetia 4-5 inches high, stout, somewhat simple, dividing above the middle into 2 or 3 long branches, sending out irregularly short branchlets terminated by the subglobose, black apothecia, the phyllocladia more or less confluent, passing into papillæ which are elongated and terete at the base ; cephalodia scrobiculate-pitted, the gonomia irregularly arranged in cylindraceous nodules. Spores from fusiform acicular, 4-10 locular, 10-24 times longer than wide ; spermatia acicular, falcate-curved, on simple sterigmas. — Sandwich Islands, *Dr. W. Hillebrand*. — *Obs. 1864, p. 265.*

66. *S. Maderense*, Tuckerm. ; thallus stout, terete, and commonly naked at the mostly simple base, dividing below the middle into a few elongated, rather simple, erectish,

obsoletely tomentose branches, with often nodding tips. *Phyllocladia* very small, globose, somewhat scattered, becoming flat, and larger especially on the branches, crenate, glaucescent. *Cephalodia* sessile, scrobiculate-pitted; apothecia subterminal, middling-sized, flat, at length nearly excluding the thick white margin. Spores acicular, variously divided.—*Madeira*.—*Wilkes Exp. p. 122.*

67. *S. tenellum*, Tuckerm.; *Wilkes Exp. p. 123, & t. 2, f. 3*, equals *S. albicans*, (Th. Fr.) Nyl.: *Syn I.*, p. 234.

68. *Cladonia dactylota*, Tuckerm.; squamules ample, erect, white-powdery beneath: podetia slender, cylindrical, membranaceous-corticate, smooth, greenish-pallescent, the cups narrow, the denticulate margin somewhat incurved, at length obliquely proliferous-palmate: apothecia brownish-flesh-coloured.

b. *sympycarpia*, the apothecia conglomerate.

c. *sorediata*, the podetia and scyphæ here and there covered with white-powdery soredia.—*Cuba, Wright. Venezuela, Fendler*.—*Supp. 2, p. 204.*

69. *C. Dilleniana*, Tuckerm.; thallus squamulose-dissected, the podetia above infundibuliform, proliferous-ramose, the axils pervious, subsquamulose, from strawcoloured whitening, the fertile ones somewhat cymose; apothecia brown.

a. *crispata*; strawcoloured, the podetia turgid, the dilated axils exasperate with linear-multifid leaflets. *C. stenophylla*, Nyl. *Syn. p. 201.*

b. *elongata*: whitening, the slender podetia repeatedly proliferous, the gaping axils cristate with dissected leaflets.—*Cuba, Wright*.—*Obs. 1864, p. 391.*

70. *C. hypoxantha*, Tuckerm.; thallus small, cæspitose, subfoliaceous, the leaflets narrowly linear, elongated, ramose-multifid, the margin crenulate, above greenish-strawcoloured, beneath brown-orangecoloured; podetia turbinate-cylindrical,

cartilagineous-corticate, verrucose-rugulose, the cups concave, somewhat radiate at the margin, or obliterated; apothecia scarlet.—Trees, Cuba, *Wright*.—l. c. p. 393.

71. *C. gracilenta*, Tuckerm.; squamules minute, laciniate, strawcoloured, beneath white; podetia slender, much elongated, membranaceous-corticate, smooth, strawcoloured, dividing into spreading, intertwined branches, the cups very small, proliferous from the margin, rarely from the centre, toothed, the fertile ones thickened above and fimbriate-radiate; apothecia scarlet.—Cuba, *Wright*.—l. c. p. 395.

72. *Coenogonium moniliforme*, Tuckerm., l. c. p. 416. *Syn. I.*, p. 258, *q. v.*

73. *Biatora rhodopis*, Tuckerm.; thallus uniform, thin, cartilagineous-membranaceous, smooth, rimulose, glaucous-ashecoloured, vermillion within; apothecia sessile, at length difform, the tumid, entire, at length flexuous margin deep-rosecoloured, the disk somewhat plane, naked, blackish-red, the hypothecium black. Spores simple, ellipsoid.—Bushes, Cuba, *Wright*.—*Supp. 2*, p. 205.

74. *B. virella*, Tuckerm.; thallus uniform, subtartareous, rugose-granulate, glaucous-sulphurcoloured; apothecia sessile, the thin, entire, soon flexuous, vanishing margin paler than the plano-convex, reddish-brown disk. Spores small, ellipsoid, subfusciform, simple, 3 times longer than wide.—Rocks, Cuba, *Wright*.—l. c. p. 205.

75. *B. pyrrhomelæna*, Tuckerm.; thallus of minute, rounded, soon subsquamaceous, imbricate, glaucescent granules, within vermillioncoloured, the hypothallus blackish-red; apothecia proceeding from the hypothallus, somewhat plane, the margin very thin, erect, flexuous, blackish-red, the disk black, shining, the hypothecium red, at length convex and excluding the margin. Spores, minute, ellipsoid, simple.—Trees, Cuba, *Wright*.—l. c. p. 205.

76. *B. phæaspis*, Tuckerm.; thallus of subsquamaceous, soon coralline, pale-ochroleucous granules; apothecia appressed, reddish-brown, flexuous, at length convex and

excluding the obtuse paler margin. Spores fusiform-cylindrical, 2-4 locular, 3-4 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p. 205*.

77. *B. melampetala*, Tuckerm. ; thallus leprous-tartareous, diffract-rimose, ferruginous-fuscous, the hypothallus blackening : apothecia middling-sized, appressed, at length tumid, the black disk at first white-pruinose, the thickish, paler margin at length of the same colour. Spores fusiform-oblong, 2 locular, 3-5 times longer than wide.—Shrubs, Cape of Good Hope, *Wright*.—*Obs. 1860, p. 419*.

78. *B. oncodes*, Tuckerm. ; thallus of minute at length subconfluent granules, rimose, greenish-ashcoloured, the hypothallus fuscous ; apothecia middling-sized, appressed, the disk convex, reddish-brown, the hypothecium blackening, with a thin, paler, flexuous margin, often transformed into soredia. Spores, small, simple, oblong.—Trees, Cuba, *Wright*.—*Obs. 1864, p. 274*.

79. *B. orphnaea*, Tuckerm. ; thallus of minute at length coalescent, subimbricate, reddish-fuscous granules, the hypothallus pale-fuscous ; apothecia proliferous, minute, sessile, the disk plano-convex, blackish-brown, within blackening, the darker margin vanishing. Spores 10-15, small, oblong, simple, 2½-5 times longer than wide ; paraphyses soon distinct.—Trees, Cuba, *Wright*.—*l. c. p. 274*.

80. *B. furfurosa*, Tuckerm. ; *l. c. p. 274*. *Syn. II., p. 19*.

81. *B. polycampia*, Tuckerm. ; thallus subcartilagineous, uneven, rimose, soon sorediiferous, from olivaceous ash-coloured ; apothecia large, adnate, the disk somewhat plane, opaque, lurid-reddish, the hypothecium black, the paler, thick, obtuse margin soon flexuous. Spores 6-8, simple, from ovoid ellipsoid, 1½-2 times longer than wide.—Trees, Cuba. *Wright*.—*l. c. p. 274*. *Lich. Cub. n. 194*.

82. *B. chlororhynia*, Tuckerm. ; thallus granulose-farinose, ochroleucous : apothecia very minute, innate, plane, reddish-brown, with a thin vanishing margin. Spores 6-8, simple, ellipsoid or oblong-ellipsoid, 2½-3 times longer than wide ; paraphyses distinct.—On *Ficus*, Hong Kong, China, *Wright*.—*l. c. p. 275*.

83. *B. luteo-rufula*, Tuckerm.; thallus cartilagineous, smooth, rimulose, greenish-glaucous, the hypothallus white; apothecia middling-sized, appressed, plane, at length flexuous-lobate, the disk from yellowish-red at length fulvous, equalling the thin, entire, paler margin. Spores small, simple, from ovoid fusiform-ellipsoid, $2\frac{1}{2}$ -5 times longer than wide.—Trees, Loo Choo Islands, *Wright*.—*l. c. p.* 276.

84. *B. pellaea*, Tuckerm.; thallus very thin, leprous, greenish-ashcoloured, the hypothallus black; apothecia small, adnate, the margin thin, rugulose, brownish-black, the disk plane, opake, livid-black, within black. Spores small, from oblong somewhat staffshaped, 2-4 locular, 4-6 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p.* 276. *Lich. Cub. n.* 206.

85. *B. scitula*, Tuckerm.; thallus thin, contiguous, uneven, glaucous-green; apothecia minute, appressed, the disk soon convex, reddish-fleshcoloured, the demiss margin thin, white, entire, the hypothecium brownish. Spores dactyloid, 5-8 locular, 4-6 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p.* 276. *Lich. Cub. n.* 202.

86. *B. palmicola*, Tuckerm.; thallus very thin, contiguous, glaucous-strawcoloured; apothecia minute, sessile, the disk somewhat plane, yellowish-fulvescent, the entire, vanishing, concolorous margin at first surrounded with an accessory thalline one. Spores dactyloid, 4 locular, 2-3 times longer than wide.—Leaves of palms, Cuba, *Wright*.—*l. c. p.* 277. *Lich. Cub. n.* 201.

87. *B. thysanota*, Tuckerm.; thallus subtartareous, leprous-granulose, the granules at length confluent, the hypothallus white, fibrillose; apothecia small, sessile, the disk plane, from reddish-brown blackening, the demiss paler margin vanishing, bordered by a white stratum. Spores small, from ellipsoid subdactyloid and oblong, 2-4 locular, $2\frac{1}{2}$ -4 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p.* 277. *Lich. Cub. n.* 210.

88. *B. leucocheila*, Tuckerm. ; thallus thin, cartilaginous, uneven, ashcoloured ; apothecia middling-sized, adnate, the disk plano-convex, fuscous black, the hypothecium brown. Spores small, dactyloid or subfusiform, 4 locular, $2\frac{1}{2}$ -3 times longer than wide.—Dead wood, Cuba, *Wright*.—*l. c. p. 278.*

89. *B. microphyllina*, Tuckerm., *l. c. p. 278.* *Syn. II.*, *p. 40.*

90. *B. medialis*, Tuckerm., *l. c. p. 280.* *Syn. II.*, *p. 132.*

91. *B. livido-nigricans*, Tuckerm. ; thallus of discrete, cartilaginous, livid-glaucous granules ; apothecia minute, (0.2-0.4 mm. wide), sessile, plane, brownish-black, with a thin margin ; hypothecium pale. Spores dactyloid and oblong, 4-5 locular, 15-23 by 3-6 mic., the paraphyses distinct, capitulate.—On bark, Straits of Magellan, Hassler Exp. 1872.—*Obs. 1877*, *p. 180.*

92. *Heterothecium leptocheilum*, Tuckerm.—*Obs. 1864*, *p. 280.* *Syn. II.*, *p. 55.*

93. *H. pachycheilum*, Tuckerm.—*l. c. p. 281.* *Syn. II.* *p. 56.*

94. *H. aureolum*, Tuckerm. ; thallus cartilaginous, thin, rimose, yellow, the hypothallus blackening ; apothecia small, sessile, the disk plano-convex, opaque, dark-orange-coloured, the hypothecium pale, about equaling the thin, entire, concolorous margin. Spores 6-8, colourless, dactyloid or subfusiform, 5-6 locular, the cells rounded, 4-6 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p. 281.*

95. *H. vulpinum*, Tuckerm.—*l. c. p. 281.* *Syn. II.* *p. 57.*

96. *H. turbinatum*, Tuckerm. ; thallus of flattened granules, at length collected into a verrucose-rugulose crust, pale-yellowish-brown ; apothecia minute, turbinate, the exciple pale-brownish, stipitiform-constricted, the margin entire, the disk from concave plane, reddish-brown, the hypothecium darker. Spores 1 in oblong thekes, large, pale-brown, oblong, muriform-multilocular, 5-6 times longer than wide.—Trees, Cuba, *Wright*.—*l. c. p. 282.*

97. *H. Wrightii*, Tuckerm.; thallus of subtartareous, globose, conglomerate, glaucescent granules; apothecia middling-sized, adnate, brown and blackening, the somewhat plane at first ashy-pruinose disk at length somewhat exceeding the entire obtuse margin, the hypothecium brownish-black. Spores very numerous in elongated thekes, very minute, globose.—Earth, Cuba, Wright.—*Lecidea (Biatorella)*, l. c. p. 275. *Heterothecium*, Gen. p. 276, *Lich. Cub.* n. 235.

98. *Lecidea Simodensis*, Tuckerm.; thallus at first contiguous, subtartareous, soon diffract-verrucose, whitening; apothecia middling-sized, sessile, black, the at length convex disk with a thinnish, obtuse margin. Spores 8, small, colourless, oblong, 2 locular, 2-3 times longer than wide. —Maritime rocks, Japan, Wright.—The spores connect it with *L. grossa*, Nyl., but the type at least is perhaps easily considerable as a colourless expression of *Buellia*.—*Obs. 1862*, p. 421.

99. *L. psephota*, Tuckerm.; thallus areolate, white, the areoles minute, tumid, discrete, the hypothallus black; apothecia very small (0.2.-0.4 mm. wide), mostly immersed in the areoles, from concave plane, with a thin, incurved, persistent margin, often angulose-diform, the hypothecium black. Spores 8 in ventricose thekes, ellipsoid, simple, colourless, 12-20 by 7-10 mic., the paraphyses concrete.—Granite rocks, Straits of Magellan, Hassler Exp. 1872.—*Obs. 1877*, p. 181.

100. *Buellia Africana*, Tuckerm.; thallus crustaceous, adnate, bright yellow, radious-lobate, soon squamulose-areolate, the areoles flattened, crenulate-lobate, at the circumference rimose-multifid, beneath black; apothecia innately sessile, cupular, black, the thin flexuous margin crenulate-rugulose, the disk opaque, within white, at length convex and exceeding the margin. Spores ellipsoid, brown, 2-4 locular, 1½-2½ times longer than wide.—Rocks, Cape of Good Hope, Wright.—*Lecidea*, *Obs. 1860*, p. 406; not *B. Africana*, Müll., *Beitr. 123*.

101. *B. Japonica*, Tuckerm. ; thallus of minute, flattened, squamulose-imbricate, greenish-fuscescent granules ; apothecia small, appressed, black, the margin thin, distinct, the scabrous disk from plano-convex hemispherical, the hypothecium black. Spores 8, middling-sized, brown, ellipsoid, 2 locular, $2\frac{1}{2}$ times longer than wide.—Bark, Japan, *Wright.*—*Lecidea*, *Obs.* 1862, *p. 421.*

102. *B. catastema*, Tuckerm. ; noted as differing from *B. parasema* (Ach.) by the apparently granulose thallus, the minute, proliferous apothecia, the smaller spores, and the loose filiform paraphyses.—Cuba, *Wright.*—*Obs. 1864*, *p. 283.* *Lich. Cub. n.* 242.

103. *Graphis discurrentis*, Nyl. ; *v. Kaalensis*, Tuckerm. ; apothecia thicker, dendritic-ramose : spores larger, 8-locular.—Oahu, *H. Mann.*—*Haw. p. 230.*

104. *G. oscitans*, Tuckerm. ; thallus thin, contiguous, white : apothecia innate-prominent, flexuous, simple or somewhat branched, the blackening excipie deeply channelled, then gaping, naked, concrete with the thickish thalline one, the hypothecium colourless. Spores 8, middling-sized, oblong, submuriform (the transverse series 6-8, the longitudinal 1-2), 3-3½ times longer than wide, fuscescent.—Trees, Oahu, *H. Mann.*—*l. c. p. 231.*

105. *Opegrapha prosodea*, Ach. ; thallus compact, smooth, from greenish fuscescent, black-limited : apothecia superficial, thick, elliptical or oblong and stellate, obtuse, the disk open ; or elongated subramose, the disk narrow at length rimæform. Spores fusiform-oblong, 6-14 locular, colourless, 5-9 times longer than wide.

a. *notha* ; apothecia rounded, oval and oblong, plane, the disk dilated, brown, about equalling the obtuse margin.

b. *diaphora* ; apothecia elongated, cylindrical, somewhat closed.—Trees, Cuba, *Wright.*—*Calif. p. 32.*

106. *Arthonia cyrtodes*, Tuckerm.—Cuba, *Wright.*—*Obs. 1864*, *p. 285* ; *supra p. 135.*

107. *Siphula Pickeringii*, Tuckerm.; thallus cæspitose, brittle, smooth, subdichotomous-ramose, from glaucous whitening, the branchlets erectish, terete-compressed, at length furrowed; apothecia (abortive) lateral.—Earth, Oahu.—*Wilkes Exp. 124, & t. 2, f. 4.*

108. *Acolium leucampyx*, Tuckerm.; thallus thin, powdery, then subcontiguous, rimose, from greenish ashcoloured; apothecia small, innate-prominent, the disk somewhat plane, black, the margin within white-pruinose. Spores from cocciform soon oblong, 2-4 locular, constricted in the middle, brown.—Trees, Cuba, *Wright*.—*Trachylia, Obs. 1860, p. 390.*

109. *A. Hawaianense*, Tuckerm.; thallus thin, glaucescent, confused with the white hypothallus; apothecia middling-sized, elevated or lecanoroid-depressed, the proper exciple sunk in the thick, radiate-rugose thalloid one, the disk, plane, purple-black, immarginate. Spores minute, obtusely ellipsoid, 2 locular, brown, about 0.006 mm. long.—Trees, Oahu, *H. Mann*.—*Haw. p. 262.*

110. *Calicium leucocholorum*, Tuckerm.; thallus of granules confluent into a thin, subcontiguous, uneven, yellow crust, decussated by the black hypothallus; apothecia clavate-turbinate, beneath rustcoloured, the stout stipe black. Spores large, ellipsoid, constricted in the middle, 2 locular, blackish-brown, 1½-2 times longer than wide.—Palm trees, Cuba, *Wright*.—*Obs. 1860, p. 389.*

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